

Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

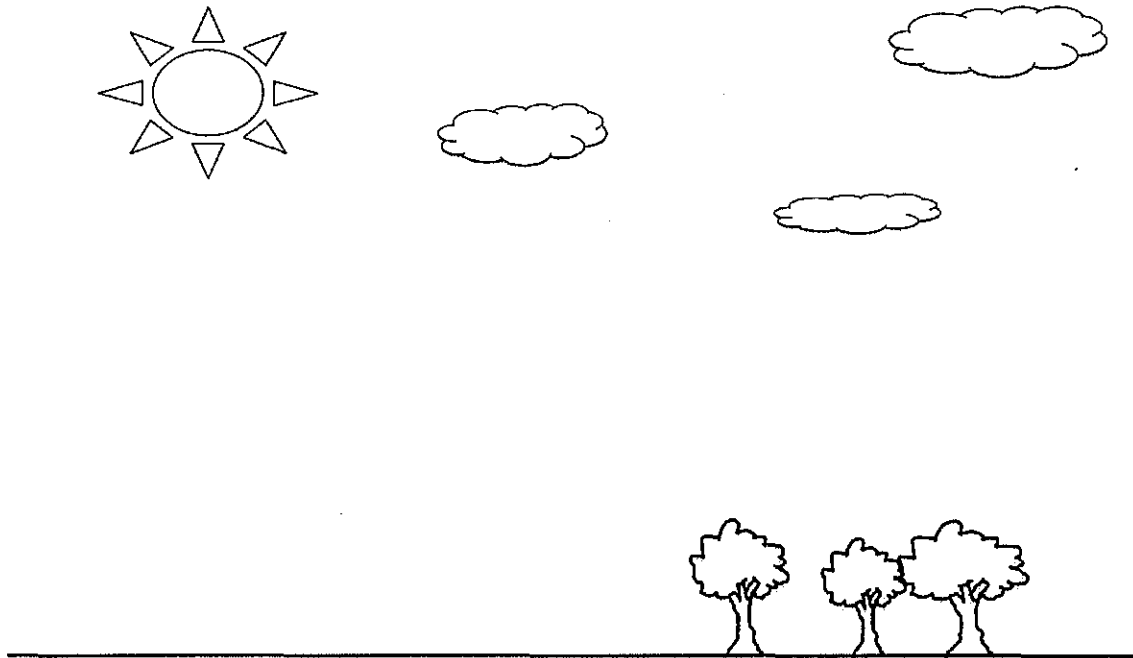
PART 1: Background Notes

ISP203A - Global Change Greenhouse Effect

GROUP #:
Student IDs of Members Present:

1

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	GREENHOUSE GASES	TRAPPING HEAT
Soil, plants, other surfaces in greenhouse	EARTH'S SURFACE	REFLECTING OR ABSORBING (RERADIATING)
Solar radiation	SOLAR RADIATION	BOTH HEAT INSIDE
Heat inside greenhouse	IR RADIATION > HEAT IN ATMOSPHERE	WHAT IS TRAPPED
Reflection of visible light off the glass	REFLECTION OFF (OZONE) GLASS	KEEP FROM ENTERING ^ RADIATION
Vents in the greenhouse	HOLE IN THE ATMOSPHERE > SPACE	LET HEAT ESCAPE

1

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

THE GREENHOUSE EFFECT: THE SUN EMITS RADIATION AND ENTERS THE ATMOSPHERE. IT CAN BE REFLECTED OR ABSORBED BY THE EARTH'S SURFACE. WHEN IT ENTERS THE ATMOSPHERE IT IS VISIBLE LIGHT AND IT REFLECTS AS INFARED HEAT. THE IR HEAT IS RERADIATED THROUGH THE ATMOSPHERE BY GREENHOUSE GASES (METHANE, CO₂, WATER VAPOR). THE MORE GREENHOUSE GASES, THE MORE IR HEAT IS TRAPPED IN THE ATMOSPHERE.

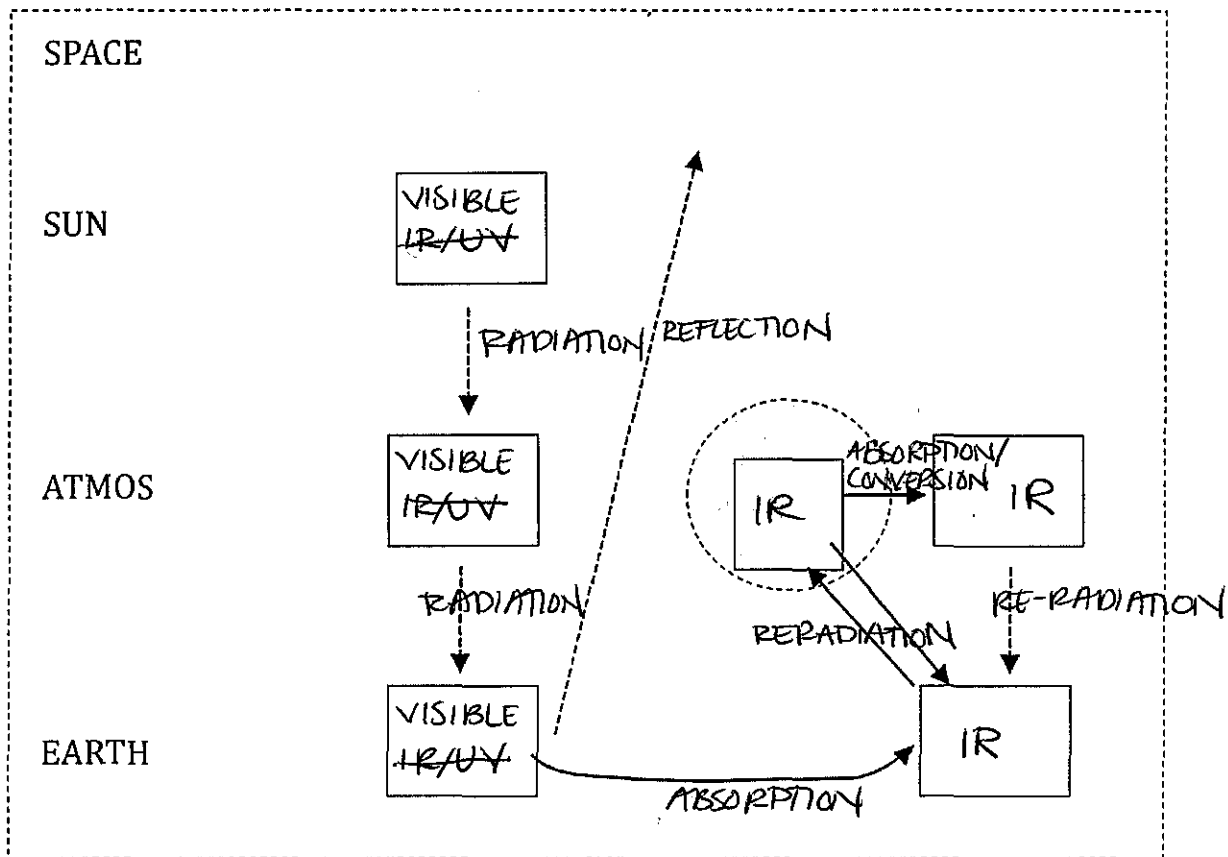
3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

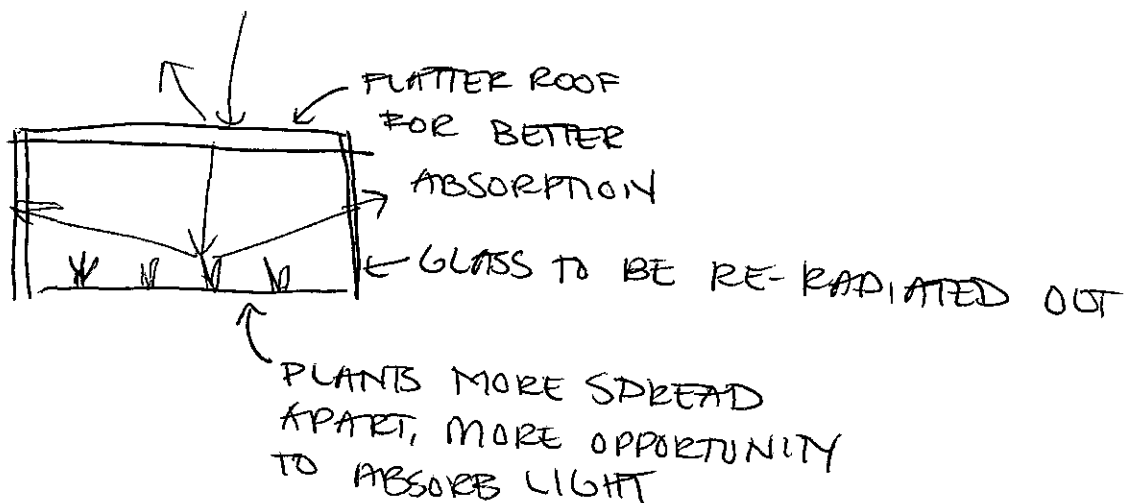
Greenhouse	Difference	Greenhouse Effect
Glass	PHYSICAL VS. INVISIBLE BARRIER	Greenhouse Gases

2

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR (Infrared)** energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

ISP203A – Global Change
Greenhouse Effect

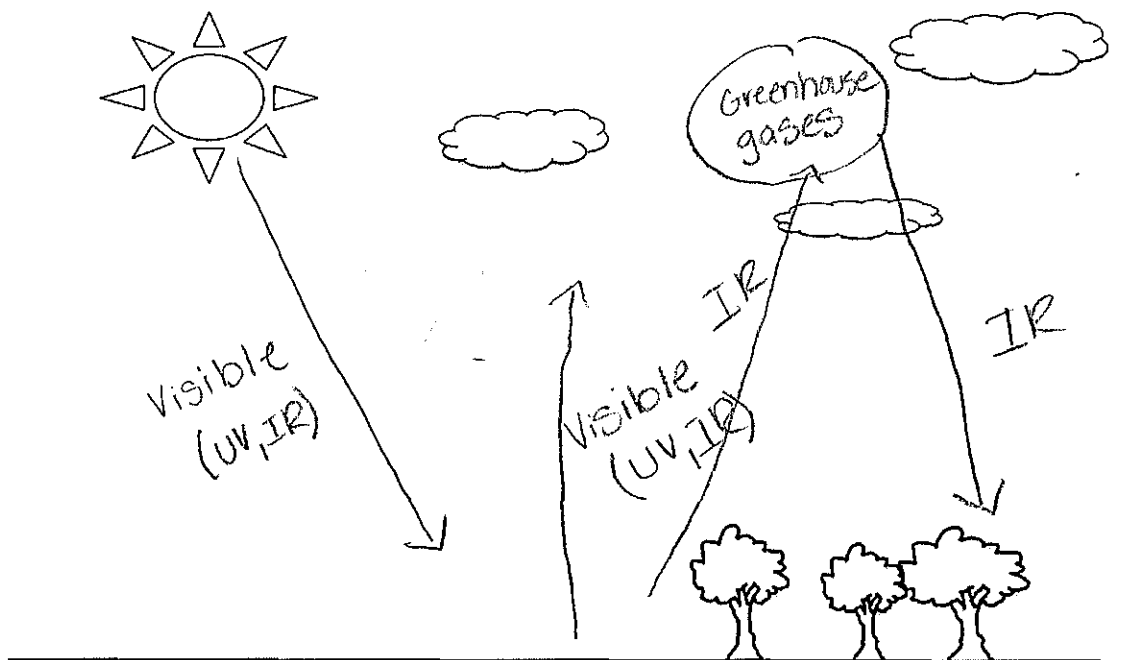
GROUP #: 2

Student IDs of Members Present:

A42081601 A40741960

A43481863 A38181168

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Greenhouse gases	They trap the infrared heat
Soil, plants, other surfaces in greenhouse	Atmosphere/ground	They absorb + reradiates infrared heat
Solar radiation	solar radiation	They serve as a heating source
Heat inside greenhouse	heat in atmosphere	both are sustained by solar radiation
Reflection of visible light off the glass	Reflection of visible light off the ground	balance and maintain heat
Vents in the greenhouse	atmosphere space (loss of infrared)	both release heat

2

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!

2. Write a complete explanation of the greenhouse effect process in words.

The greenhouse effect is the sun emitting visible light onto the earth. The UV/IR rays are either absorbed on the earth or reflected back out. The greenhouse gases (water vapor, methane, CO₂) and the radiation from the sun heats the earth.
This has both negative + positive effects here on Earth.

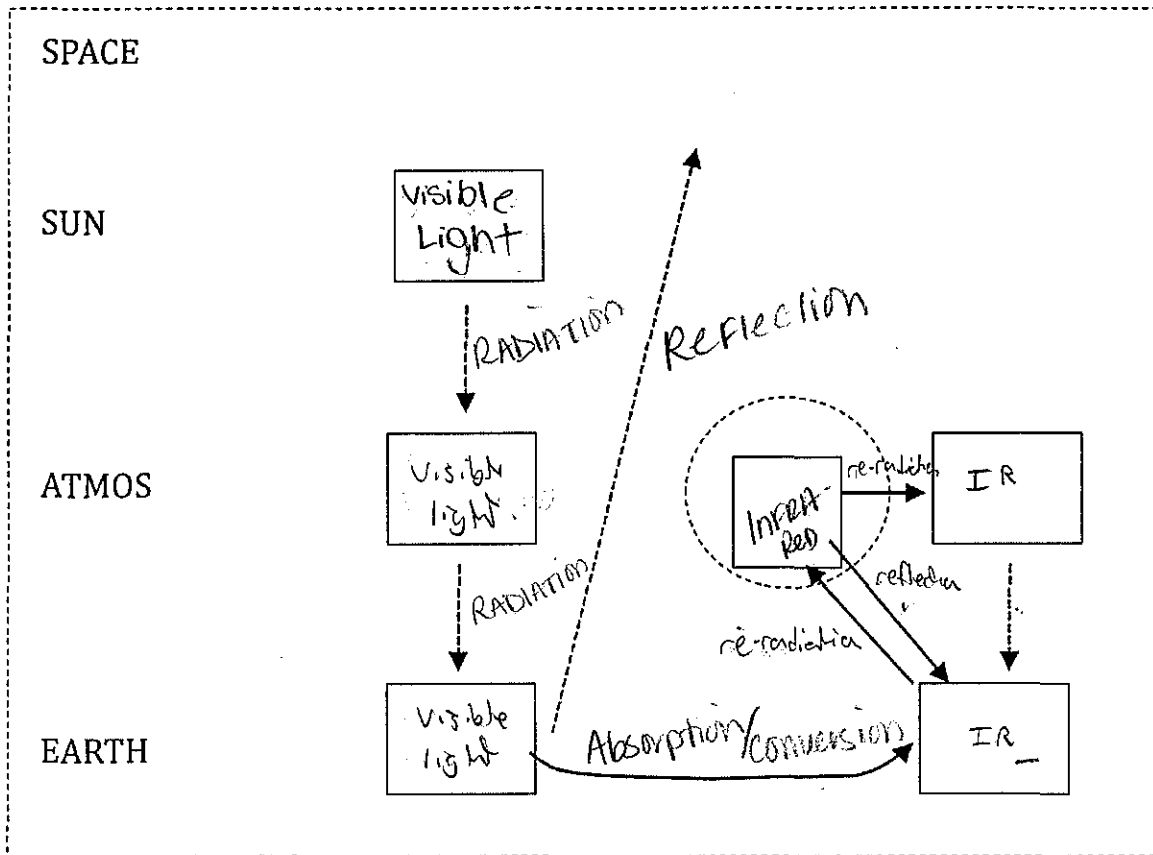
3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

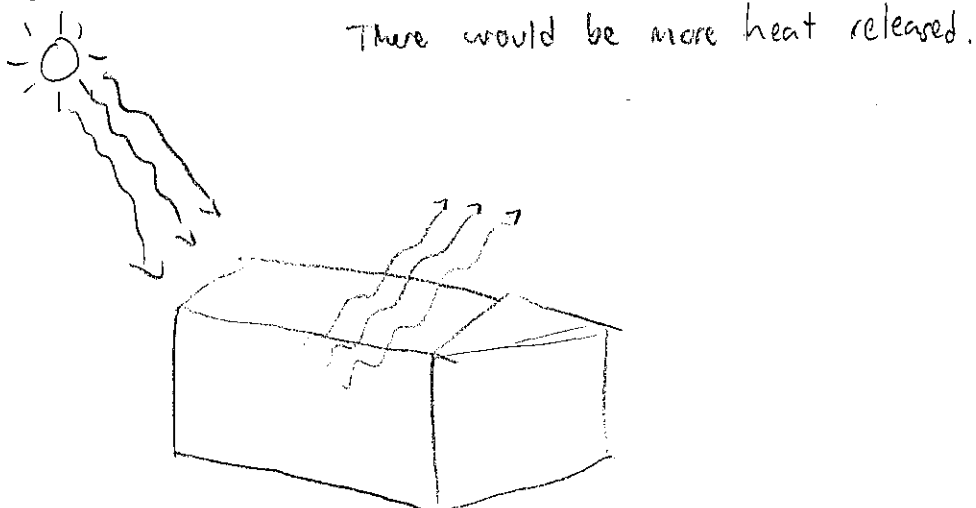
Greenhouse	Difference	Greenhouse Effect
Glass	Glass lets the light in whereas greenhouse gases traps the light	Greenhouse Gases

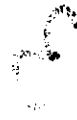
2

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR (Infrared)** energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.





Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

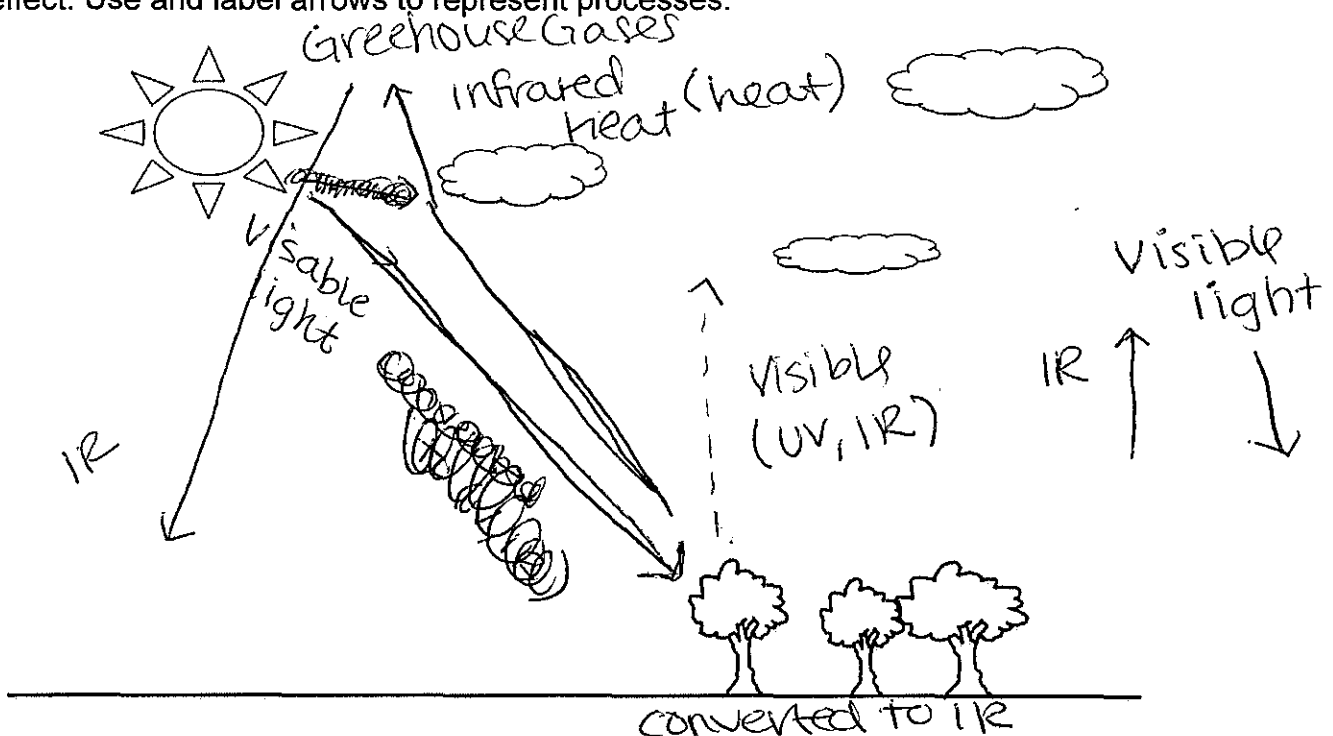
PART 1: Background Notes

ISP203A – Global Change Greenhouse Effect

GROUP #:
Student IDs of Members Present:

A42405167 A39527808
A42005403 A43206713

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Greenhouse gases	trap infrared in
Soil, plants, other surfaces in greenhouse	ground	absorb & convert Visible light
Solar radiation	solar radiation	heats
Heat inside greenhouse	heat inside atmosphere	sustains temp./ life
Reflection of visible light off the glass	reflection greenhouse gases	reflecting some of the IR heat
Vents in the greenhouse	IR that is reflected	lets some IR escape (space)



1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!

2. Write a complete explanation of the greenhouse effect process in words.

The greenhouse effect is when visible light enters the atmosphere some of this is reflected back ~~into~~ while some of it is absorbed and converted to IR. ^{some of} The IR is then trapped in the atmosphere by the greenhouse gases and reflected back, while some IR escapes ~~back~~ past the greenhouse gases and back into space.

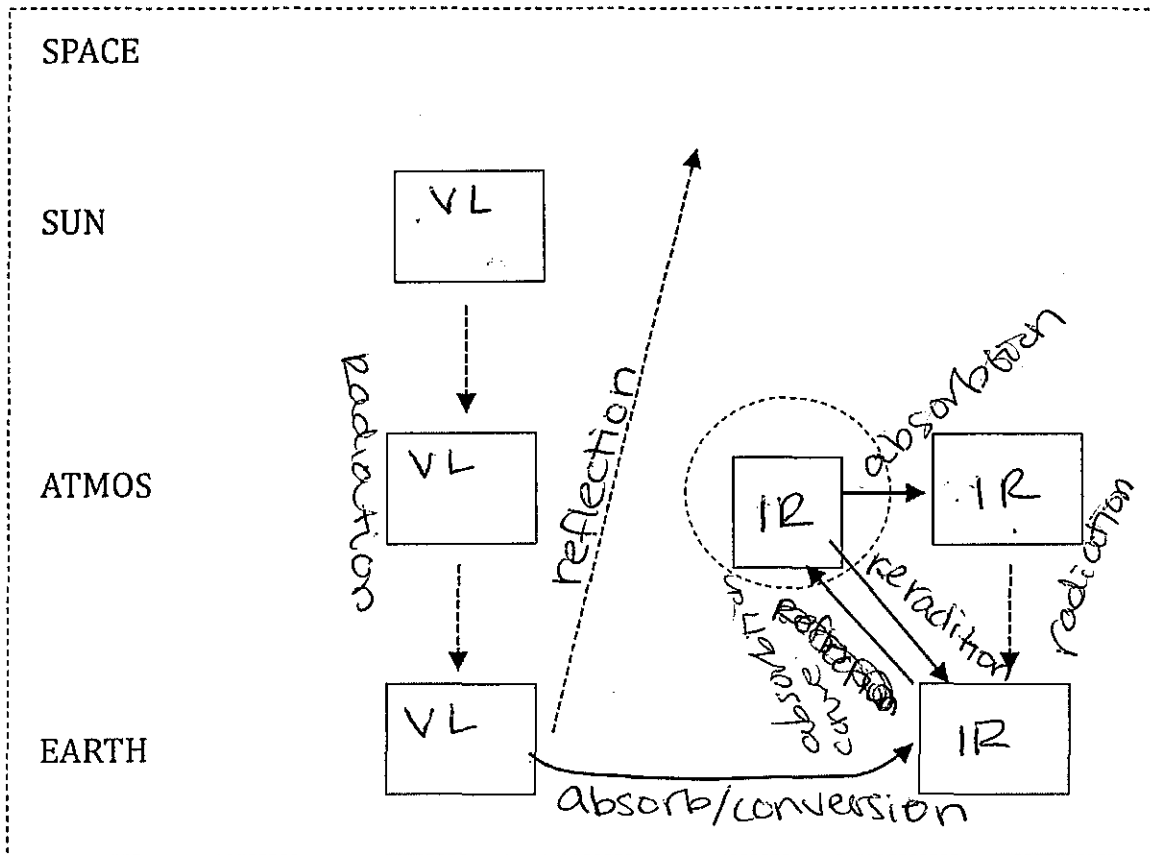
3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	<ul style="list-style-type: none"> - gases more varied/ leakier than glass - glass reflects more more 	Greenhouse Gases

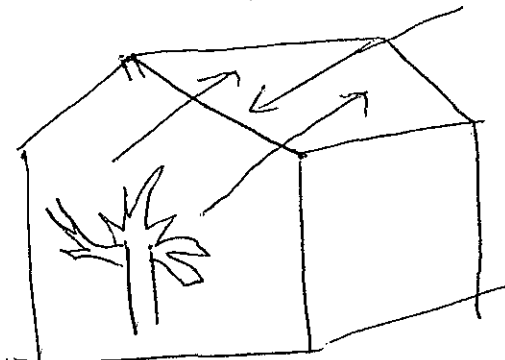
3

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR (Infrared)** energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.

Have some holes in the glass to make it as "leaky" as the greenhouse gases



3

Part 3: Homework

If you complete the group work, you may work on the homework on your own. This means your answers should be generally unique from other students' answers. **Submit your homework using ANGEL.**

1. Where would the heat radiated by the Earth go if greenhouse gases did not exist?

back into space

2. What would happen to the temperature of the atmosphere if you were to increase the amount of greenhouse gas in the atmosphere?

It would increase

3. Imagine you were having a conversation with someone who said the greenhouse effect is the cause of global warming. Write a response to this statement that is scientifically correct based on what you have learned in this class and activity.

No. Greenhouse gases help ~~life~~ sustain life too much of the gases in the atmosphere will lead to more reradiation which in turn raises the temp. of the atmosphere. But the greenhouse gases alone are not the cause. Increase in CO_2 ~~and~~ green house gases are.

20



ISP203A – Global Change Greenhouse Effect

Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

CO₂
methane
water > greenhouse gases.

- transfer
- conduction - touchy metal doorknob instead of door solid stuff
 - convection - circ. of heat.
 - radiation → energy transferred rays - light.

Infrared → Heat ← Greenhouse - visible light
ultraviolet → Heat

Visible light

ISP203A – Global Change
Greenhouse Effect

4

GROUP #: 4

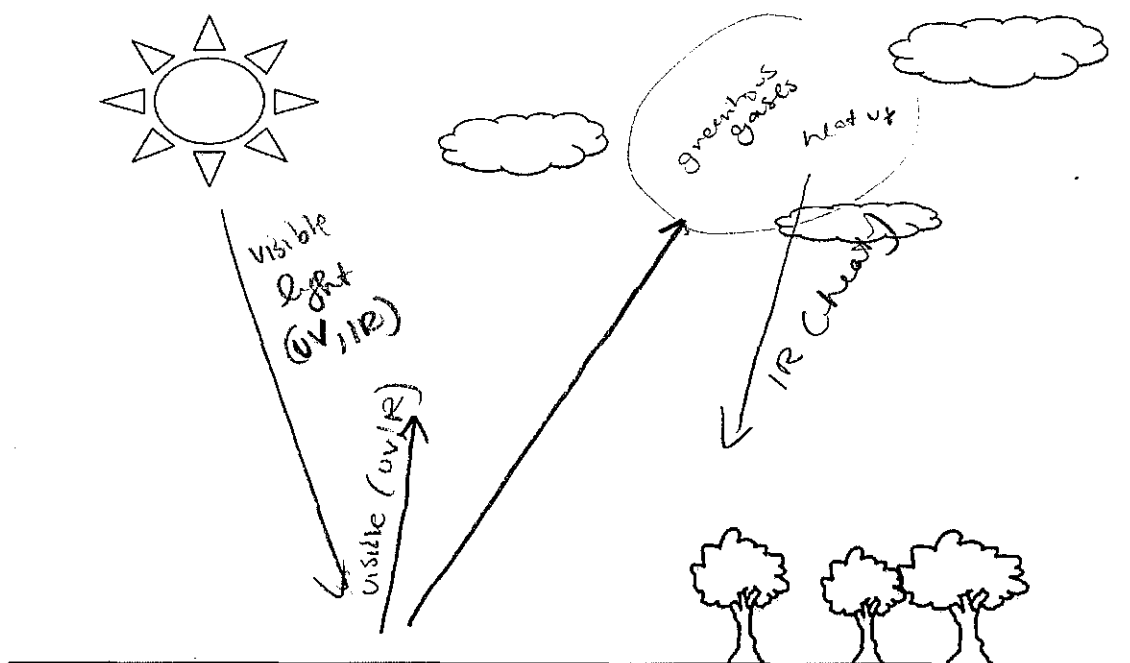
Student IDs of Members Present:

~~XXXXXXXXXX~~ A12288544

~~XXXXXXXXXX~~

A42466239

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	greenhouse gases.	traps heat in.
Soil, plants, other surfaces in greenhouse	earth's surface. recipients of heat (PPI)	absorbing.
Solar radiation	infrared radiation in atmosphere. little UV	radiating heat
Heat inside greenhouse	infrared radiation.	heat trapped in.
Reflection of visible light off the glass	IR reflected back to atmosphere.	radiating heat → reflection device.
Vents in the greenhouse	visible light that escapes.	radiating heat

space (loss of infrared)

4

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

The greenhouse effect sustains life by keeping area warm. Visible light goes from the sun thru the atmosphere to the earth. Once it hits the earth, the visible light escapes, but some of the light is trapped in the greenhouse gasses. There, it is reemitted out as infrared radiation. Thus, keeping the earth warm.

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

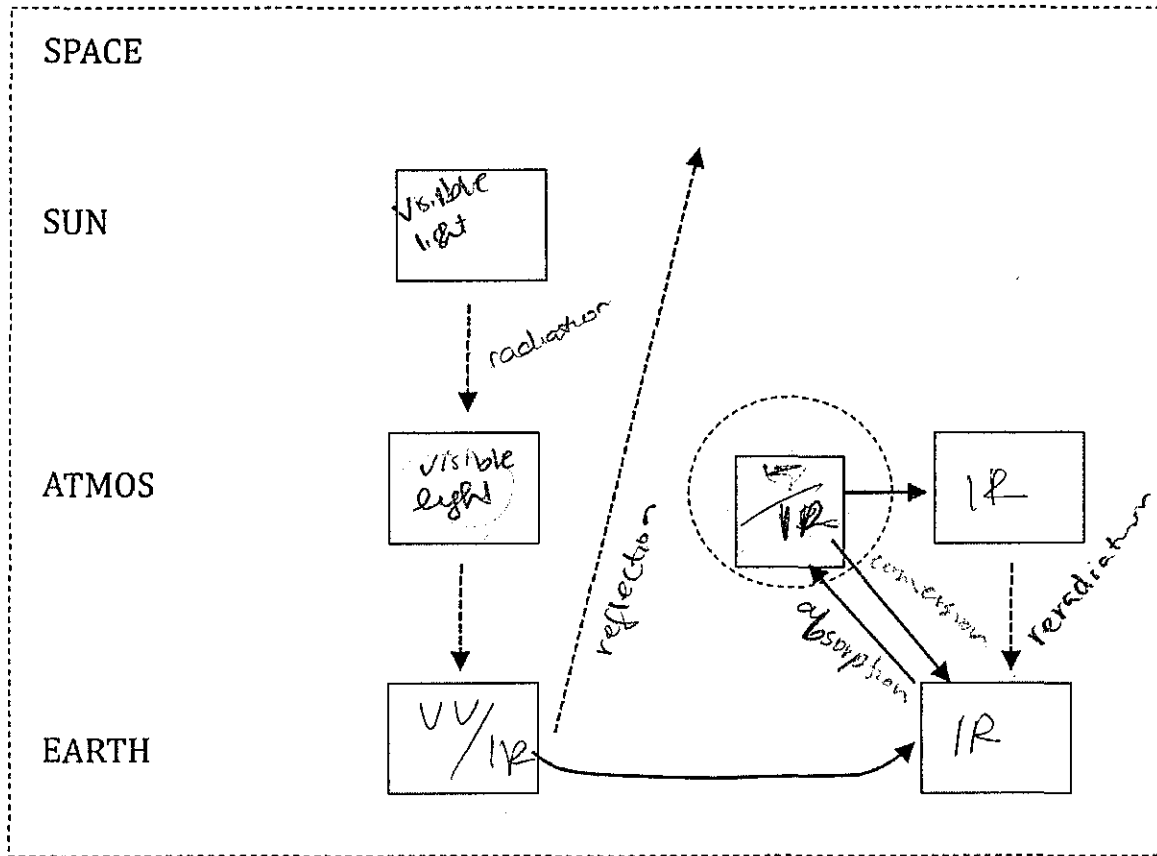
Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	glass traps heat in while the atmosphere lets some greenhouse gasses / heat out.	Greenhouse Gases

ISP203A – Global Change
Greenhouse Effect

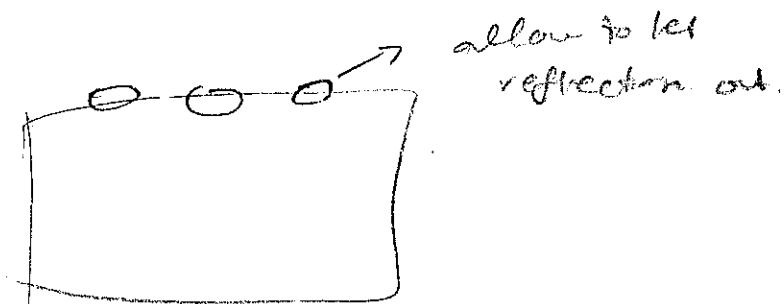
4.

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR** (Infrared) energy
 - Label each arrow with a process: **Radiation**, **Absorption**, **Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.

The new design will not let some heat out / visible light out



Objectives

Upon completing this activity, you will be able to:

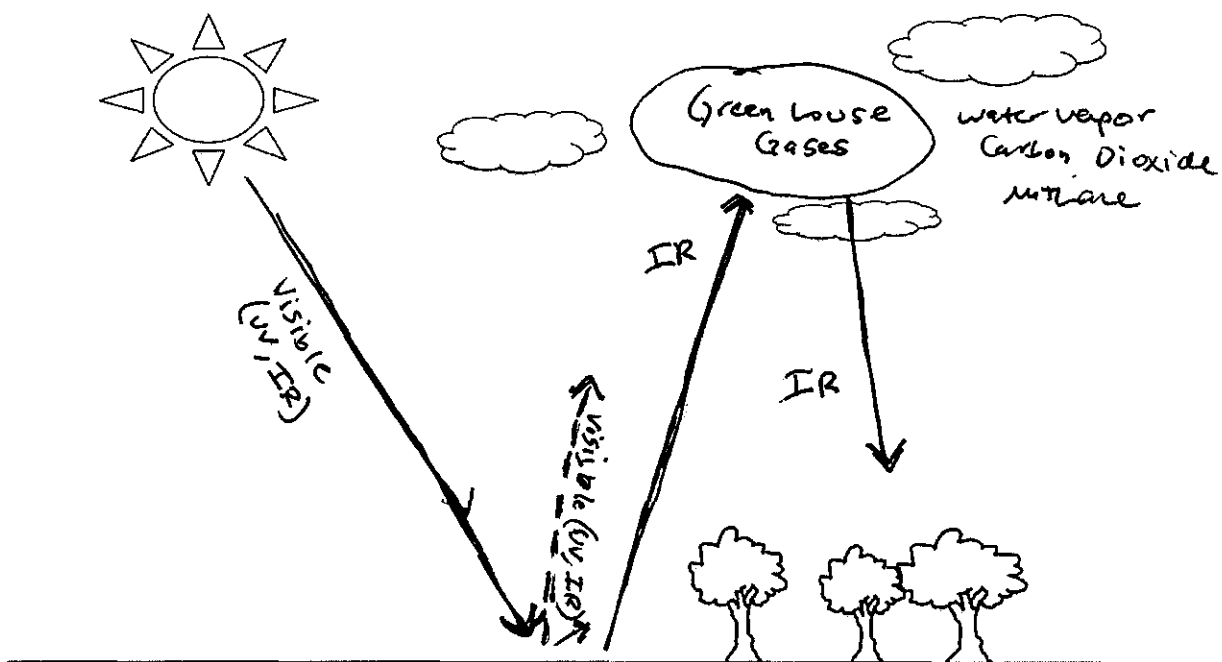
- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Greenhouse Gases	Trap infrared heat
Soil, plants, other surfaces in greenhouse	Earth's Surface	Absorbing + re-radiating heat
Solar radiation	Solar Radiation	Brings heat inside
Heat inside greenhouse	Heat inside Atmosphere	Heats the atmosphere/greenhouse
Reflection of visible light off the glass	Reflection of visible light off surface	Reflects heat back to earth/plants
Vents in the greenhouse	Space (loss of infrared)	Greenhouse gases are leaving the greenhouse/atmosphere



1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

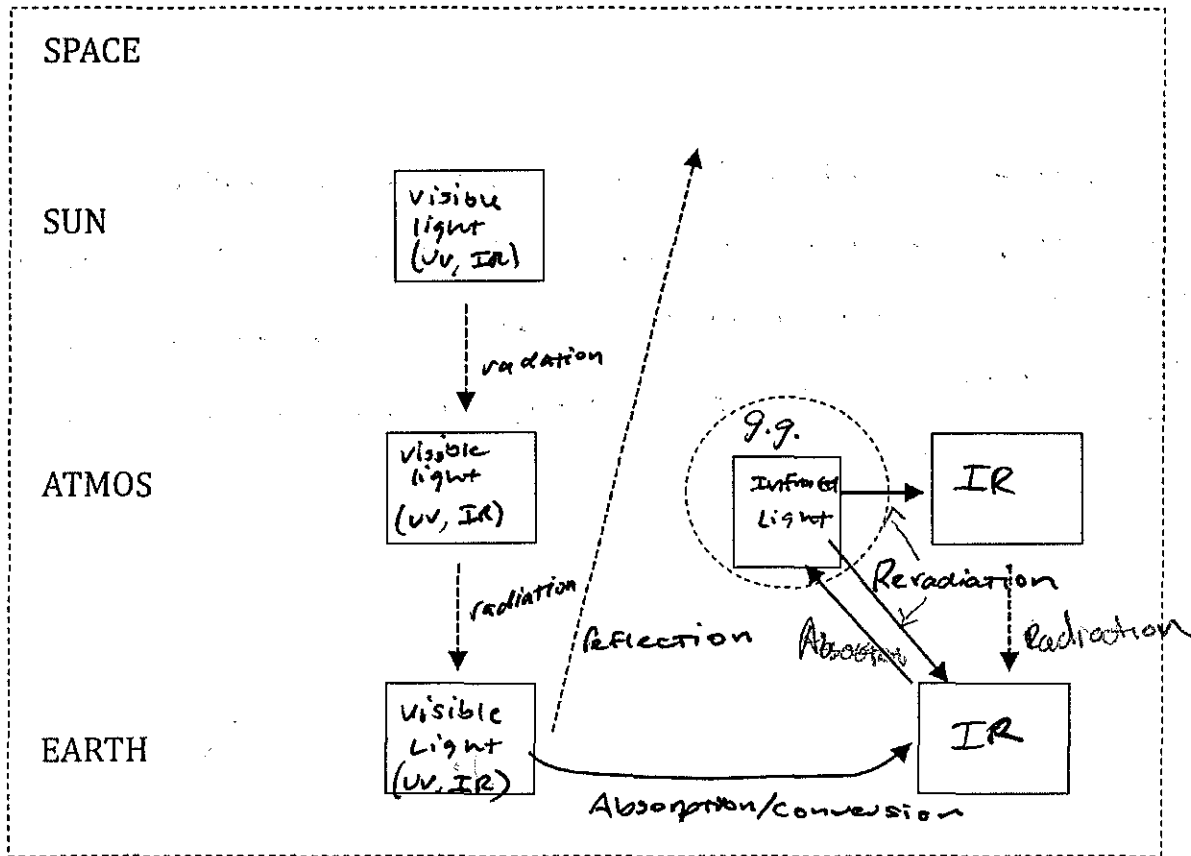
The sun gives off visible light as ultraviolet and infrared, which hits the earth's ground and bounces off the earth's surface as visible light or infrared light which gets trapped in the atmosphere by greenhouse gases acting as glass would in a greenhouse, and finally bounces down back to earth as infrared light.

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

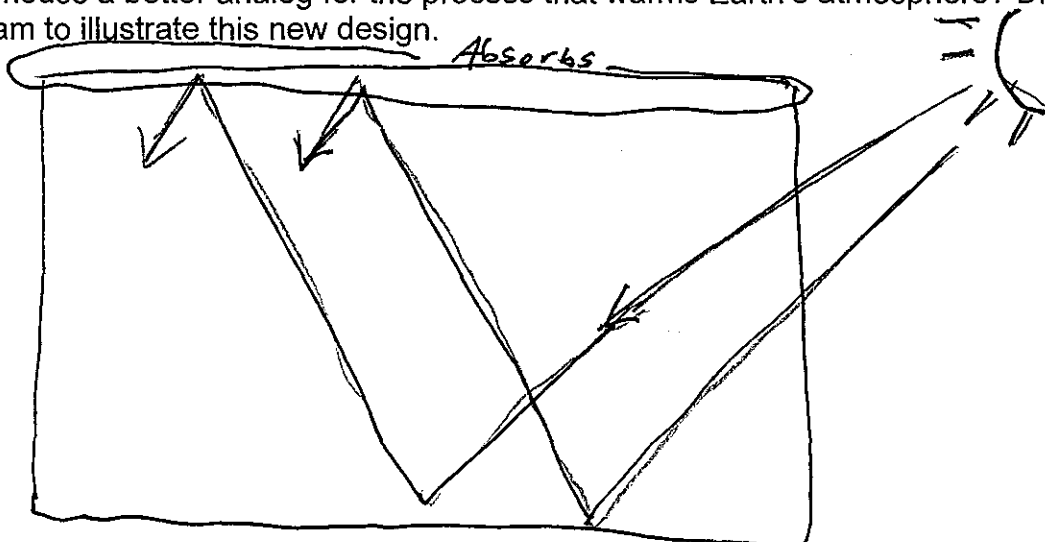
Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	The mechanism by which heat is retained	Greenhouse Gases

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light, UV, IR (Infrared) energy**
 - Label each arrow with a process: **Radiation, Absorption/Conversion, Reflection, Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



ISP203A – Global Change
Greenhouse Effect

6

Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

ISP203A – Global Change
Greenhouse Effect

GROUP #6

Student IDs of Members Present:

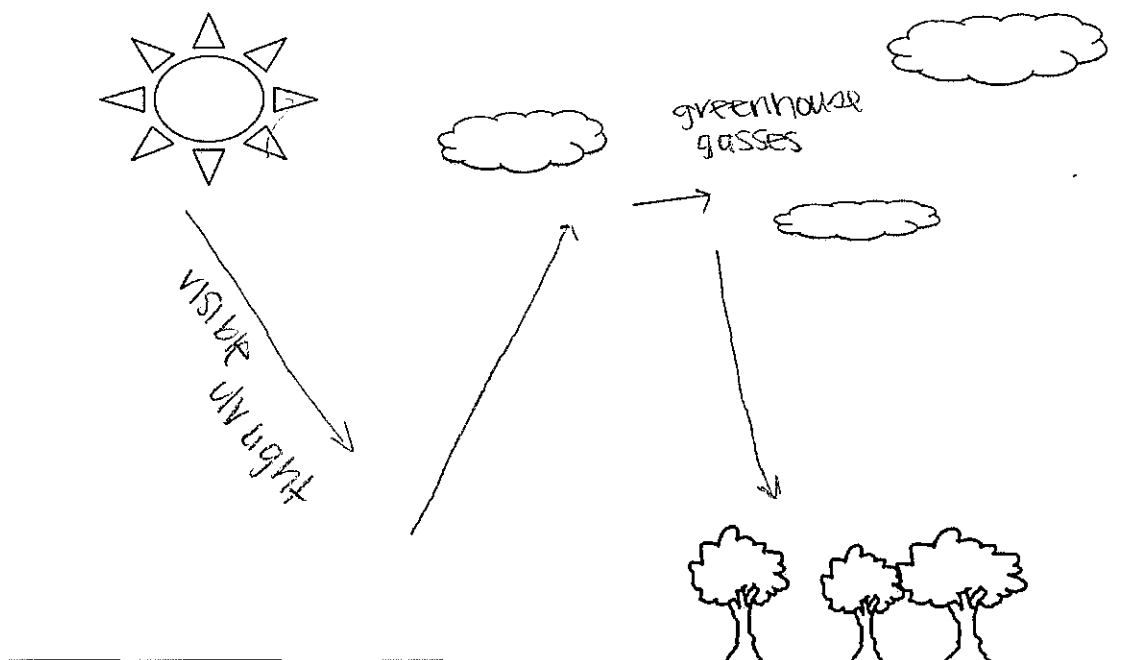
A42600005

A39966164

A42205094

A43763919

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

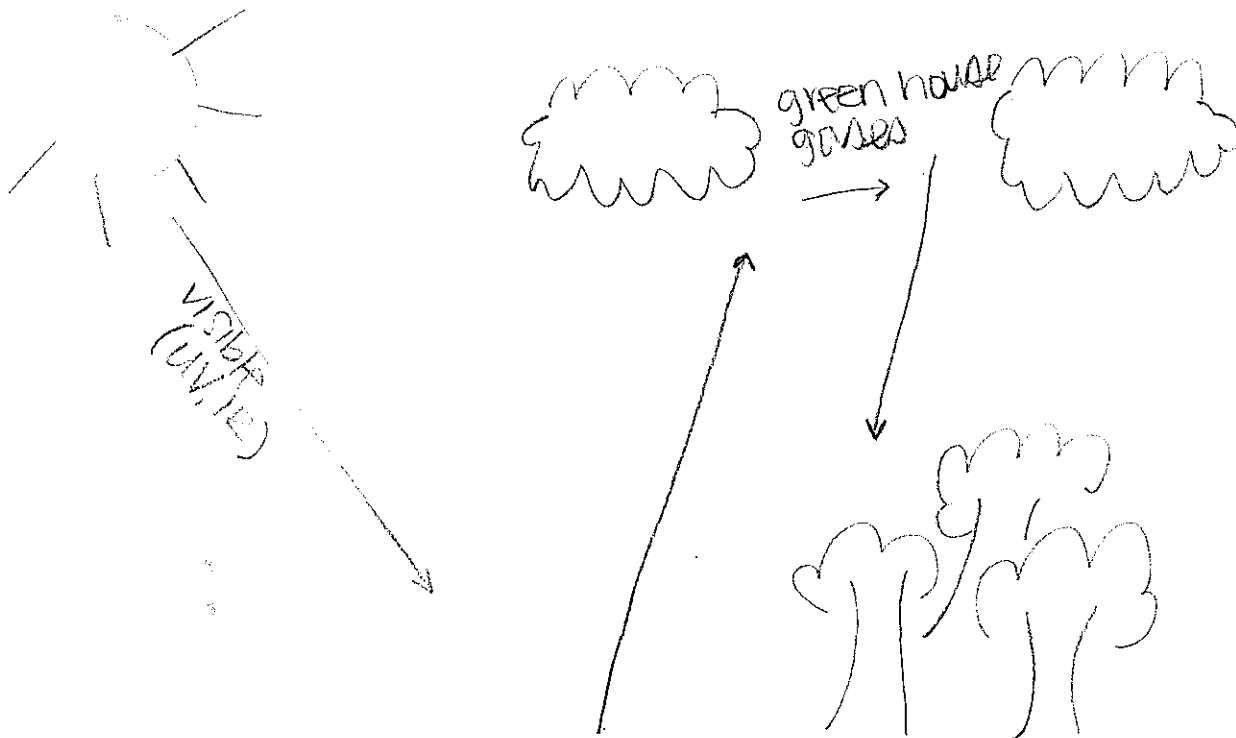
What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	greenhouse gasses	trap infrared heat
Soil, plants, other surfaces in greenhouse	Earth's surface	absorb and re-radiate heat
Solar radiation	Sun (solar radiation)	solar radiation
Heat inside greenhouse	heat in Earth's atmosphere	trap infrared heat
Reflection of visible light off the glass	absorption and emission of infrared by greenhouse gasses	surface is reflecting visible light
Vents in the greenhouse	space (loss of infrared)	lose infrared

6

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.



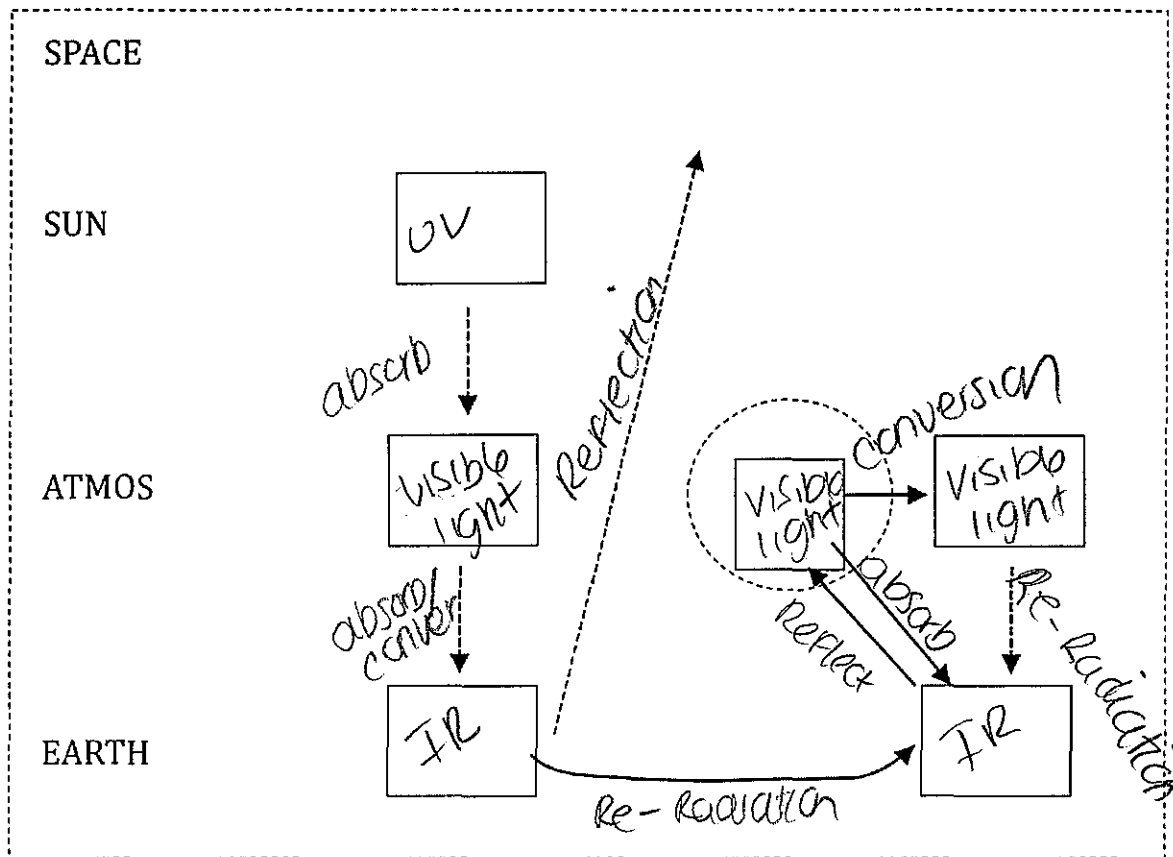
3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

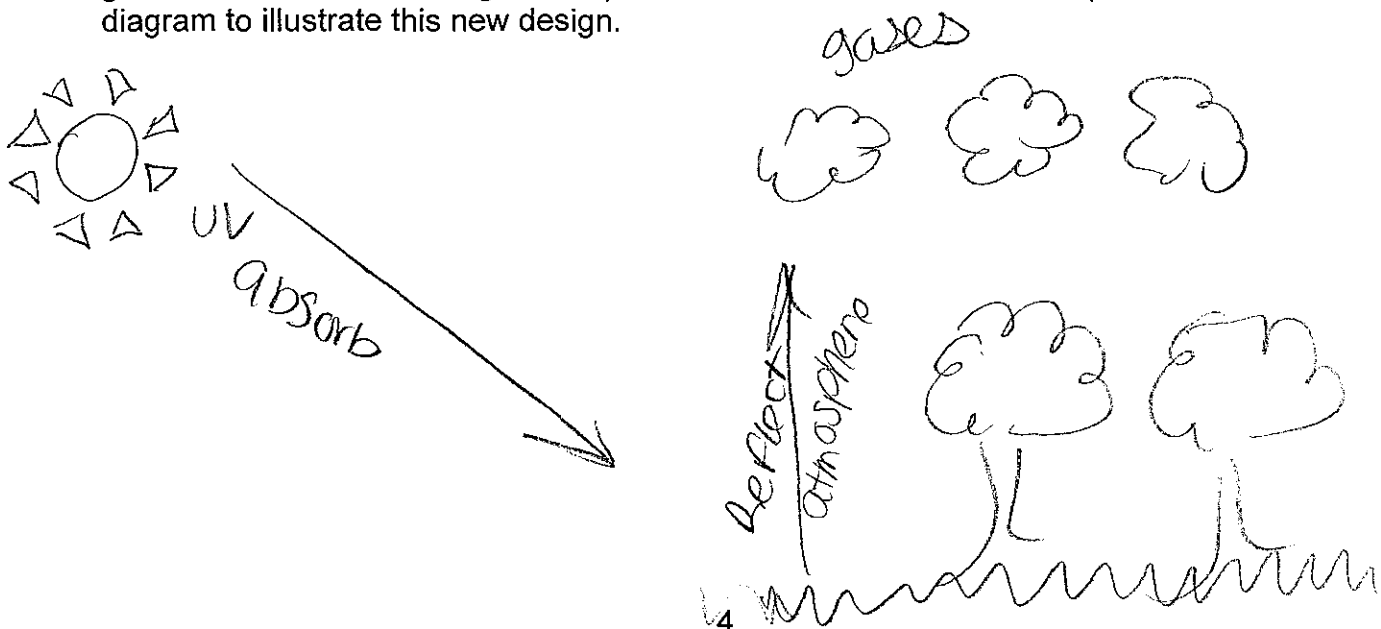
Greenhouse	Difference	Greenhouse Effect
Glass	greenhouse is only a make-model of greenhouse effect.	Greenhouse Gases

ISP203A – Global Change
Greenhouse Effect

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR (Infrared) energy**
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

ISP203A – Global Change
Greenhouse Effect

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.

GROUP #:

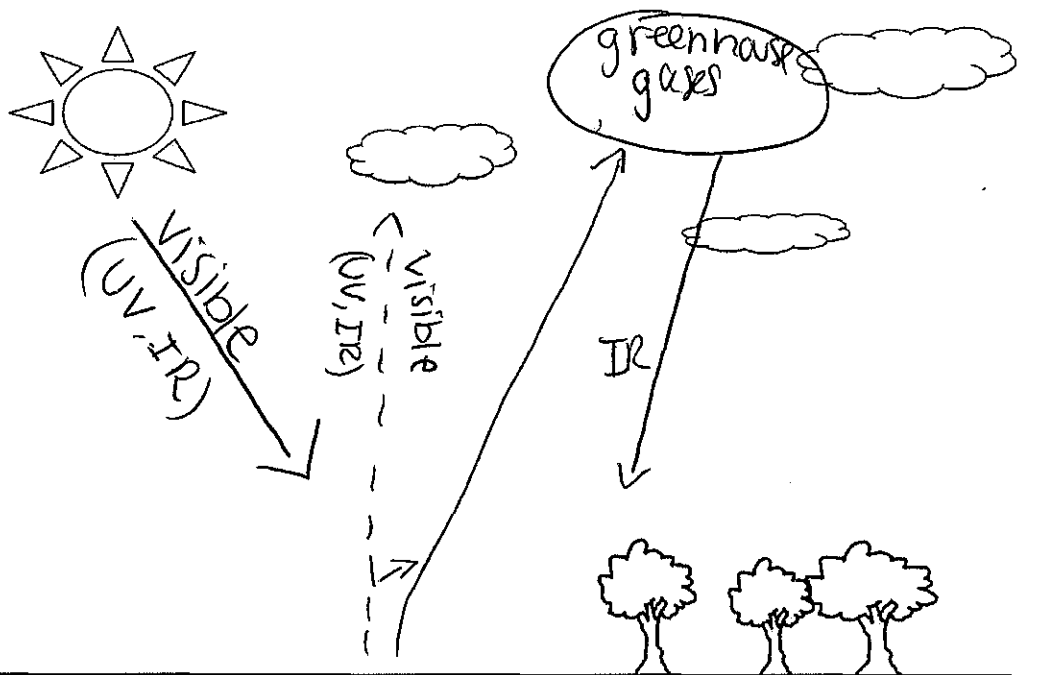
Student IDs of Members Present:

A42135792

A42100583

A42326887

A42561575



Radiation, Reflection, Absorption/Conversion

Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	gases trap heat	trap heat
Soil, plants, other surfaces in greenhouse	earth's surfaces	absorb visible light, give I.R.
Solar radiation	Same	absorb visible light, gives off I.R.
Heat inside greenhouse	heat in atmosphere	trapped heat
Reflection of visible light off the glass	reflection of	Keeps out harmful U.V. rays out, etc., keeps good thing
Vents in the greenhouse	holes in ozone	lets some heat escape in atmos

absorption and re-emittance of infrared by G.H. gases

7

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!

2. Write a complete explanation of the greenhouse effect process in words.

Sun radiates visible light & heat, passes through earth's atmosphere, then absorbed by earth. Ozone reflects most harmful rays off, visible light that was absorbed becomes refracted back as I.R.. The greenhouse gases stop some from escaping and trap it in the atmosphere.

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

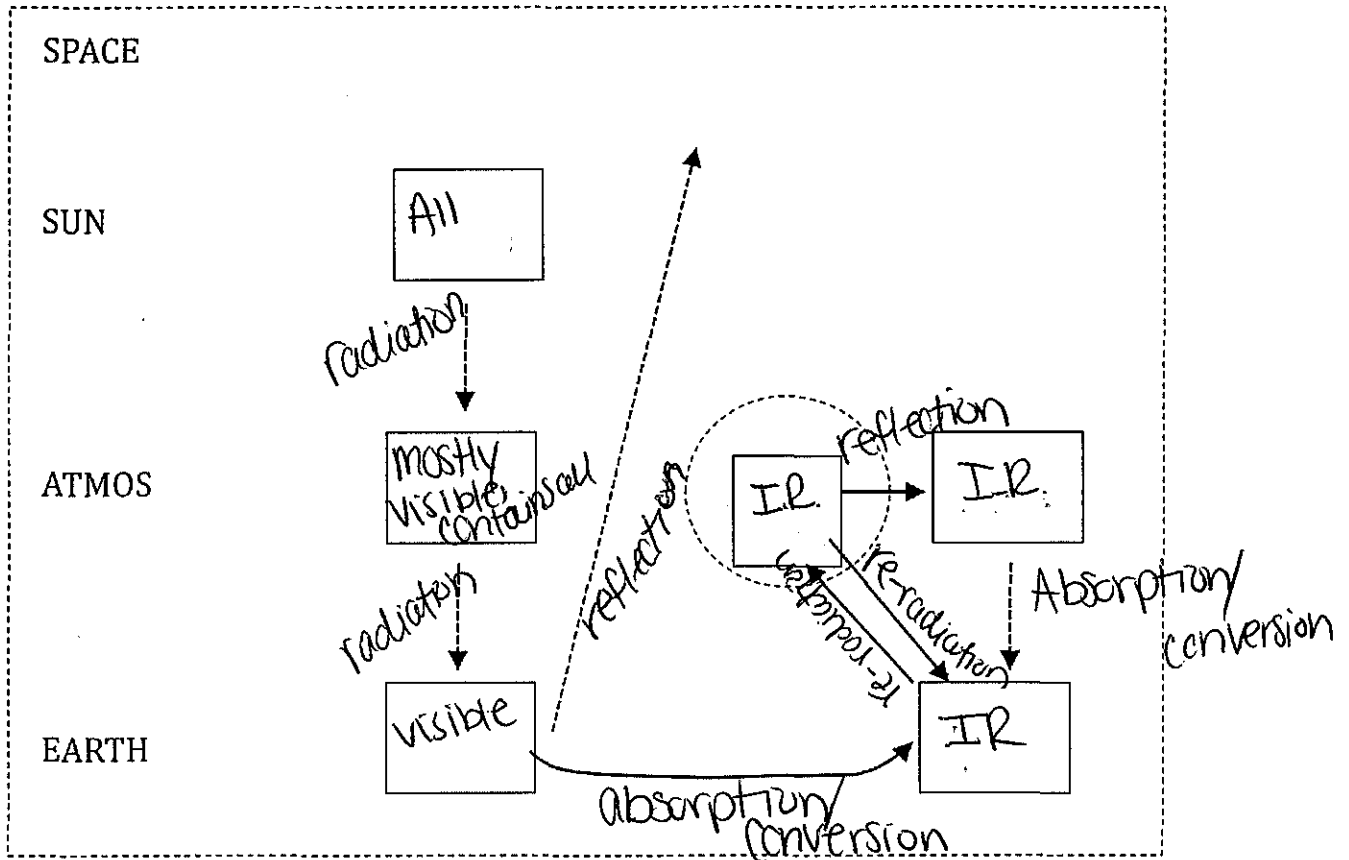
Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	glass is solid	Greenhouse Gases

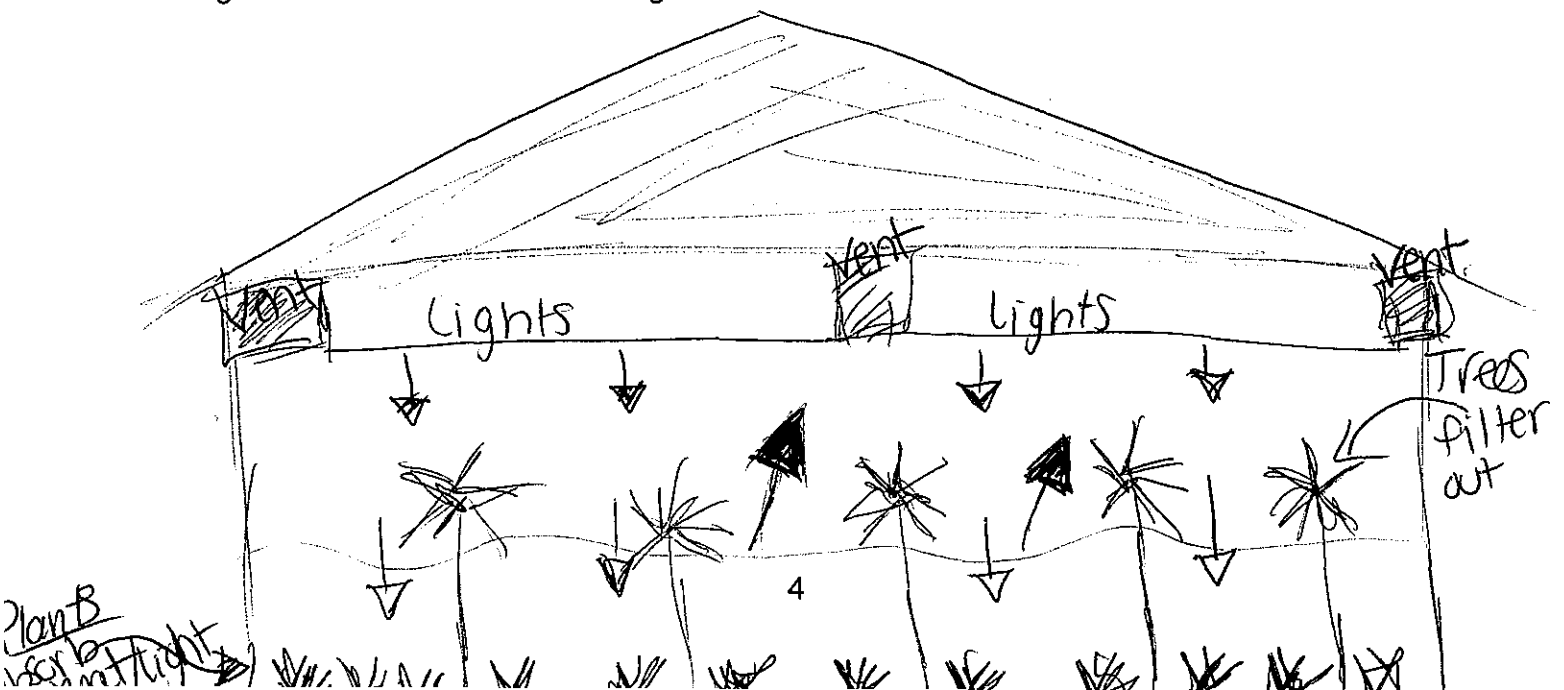
ISP203A – Global Change Greenhouse Effect

7

4. Complete the simple box-and-arrow diagram below.
 - You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR (Infrared)** energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.





Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

Atmosphere is

- Involves sun
- Carbon Dioxide
- ozone
- plants

78% Nitrogen

20% Oxygen

2% greenhouse gases

Radiation - energy transferred by electromagnetic waves (visible light/infrared)

Conduction - heat energy transfer

Convection - heat energy circulation

Infrared - 700 nanometers + above

Ultraviolet - 400 nanometers + less

ISP203A – Global Change
Greenhouse Effect

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.

GROUP #: 8

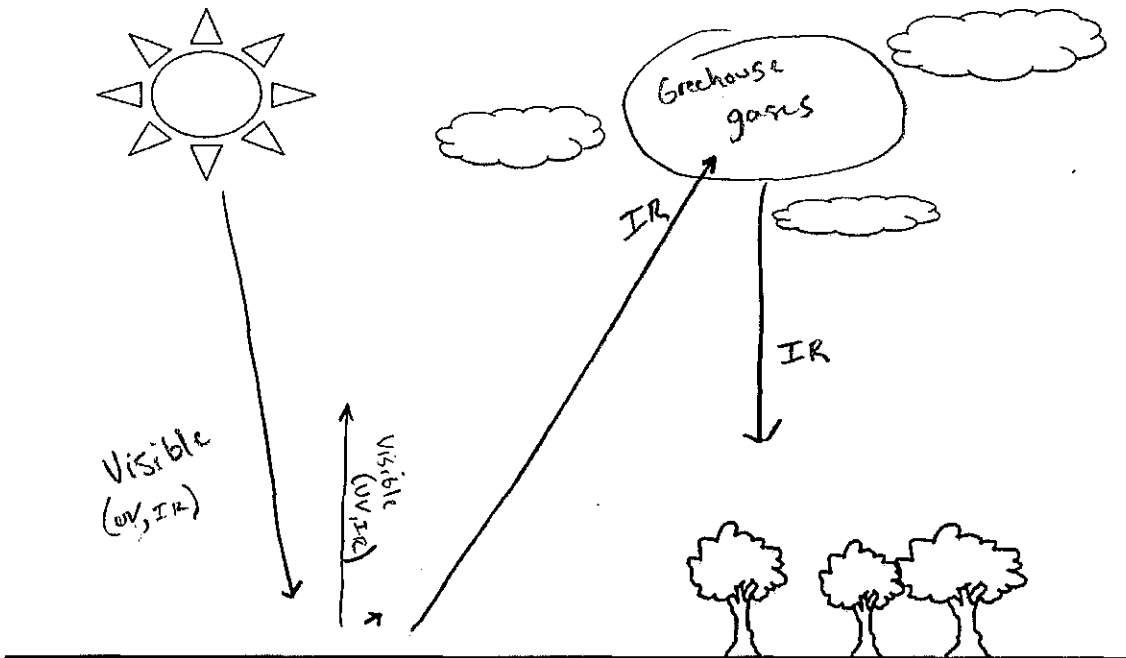
Student IDs of Members Present:

A39223581

A40833474

A42311768

A43866027



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Greenhouse gases	traps in heat
Soil, plants, other surfaces in greenhouse	Earth's surface	Absorbs heats and reradiates
Solar radiation	Solar Radiation	Provides heat
Heat inside greenhouse	Heat in atmosphere	Main source of energy
Reflection of visible light off the glass	Absorbs and releases infrared by greenhouse gases	warms environment
Vents in the greenhouse	Space	loss of infrared



1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

Visible light is given off in the form of ultraviolet and Infrared by the sun and then is absorbed by the soil. The soil then releases visible light which we see and also releases infrared energy into the atmosphere into the greenhouse gases. Then some infrared energy is then released back into our atmosphere from the greenhouse gases.

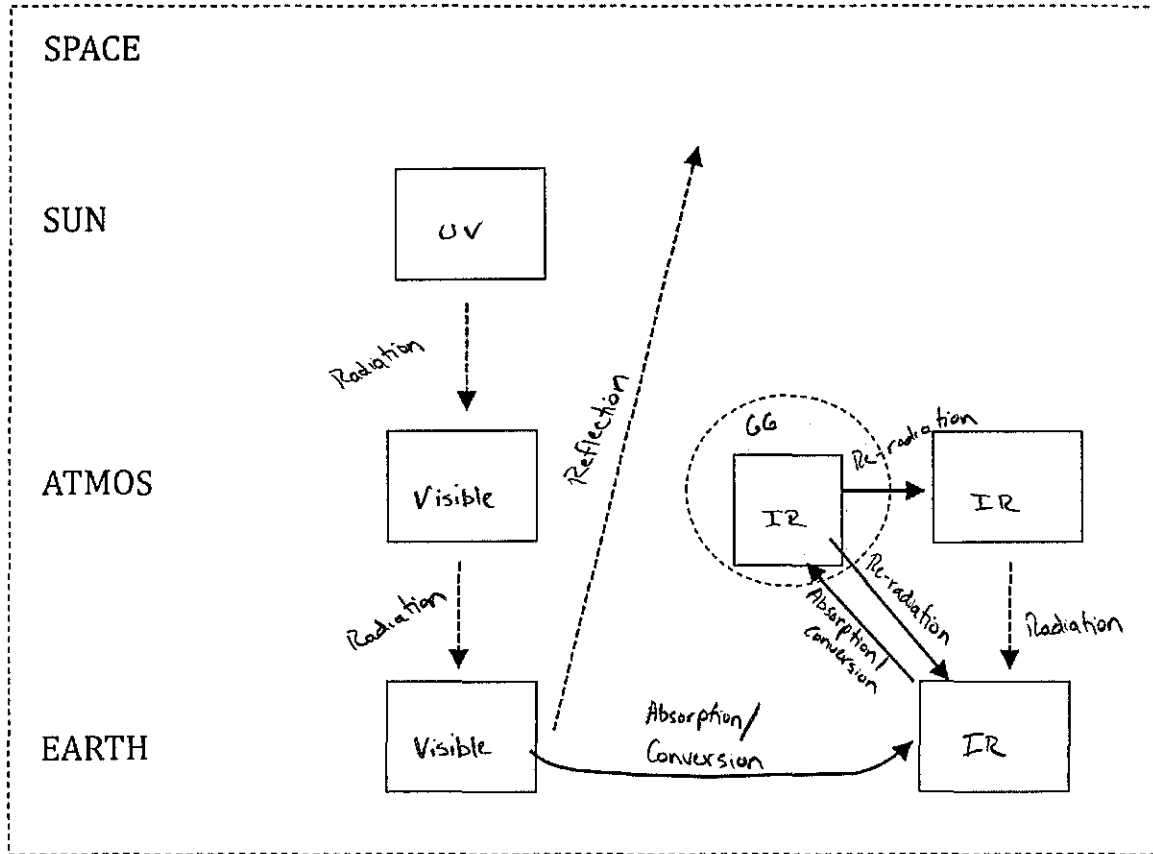
3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

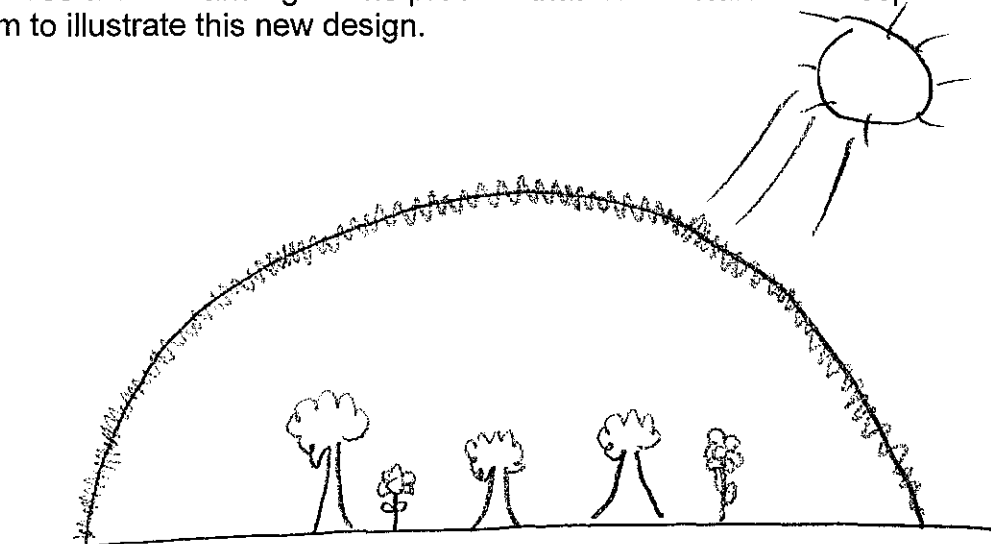
Greenhouse	Difference	Greenhouse Effect
Glass	Greenhouses gases changes the form of light entering our atmosphere where as glass just reflects the gases.	Greenhouse Gases

8

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR (Infrared)** energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

ISP203A – Global Change
Greenhouse Effect

GROUP #: 9
Student IDs of Members Present:

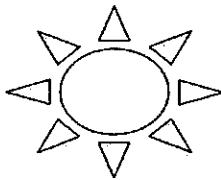
A41650757

A40786055

A43334997

A40680269

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



GHG = greenhouse gases

Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	GHG	trapping light (IR) and not releasing it
Soil, plants, other surfaces in greenhouse	Earth's surface	absorbing UV and IR and releasing GHG and heat
Solar radiation	solar radiation	heat and IR light
Heat inside greenhouse	heat inside atmosphere	heats the atmosphere/GH
Reflection of visible light off the glass	reflection off of GHG molecules in atmosphere	trapping IR heat/light inside by reflecting
Vents in the greenhouse	IR gets through the GHG	releasing small amount of IR

Space

(loss of IR)

9

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!

2. Write a complete explanation of the greenhouse effect process in words.

The sun's visible light radiates to the Earth's surface. The surface absorbs the v and IR light/energy from the sun and reflects the visible light back into the atmosphere. The greenhouse gases in the atmosphere absorb the IR and re-radiate it back into the atmosphere to be absorbed by the surface. Heat is trapped in the Earth's atmosphere.

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

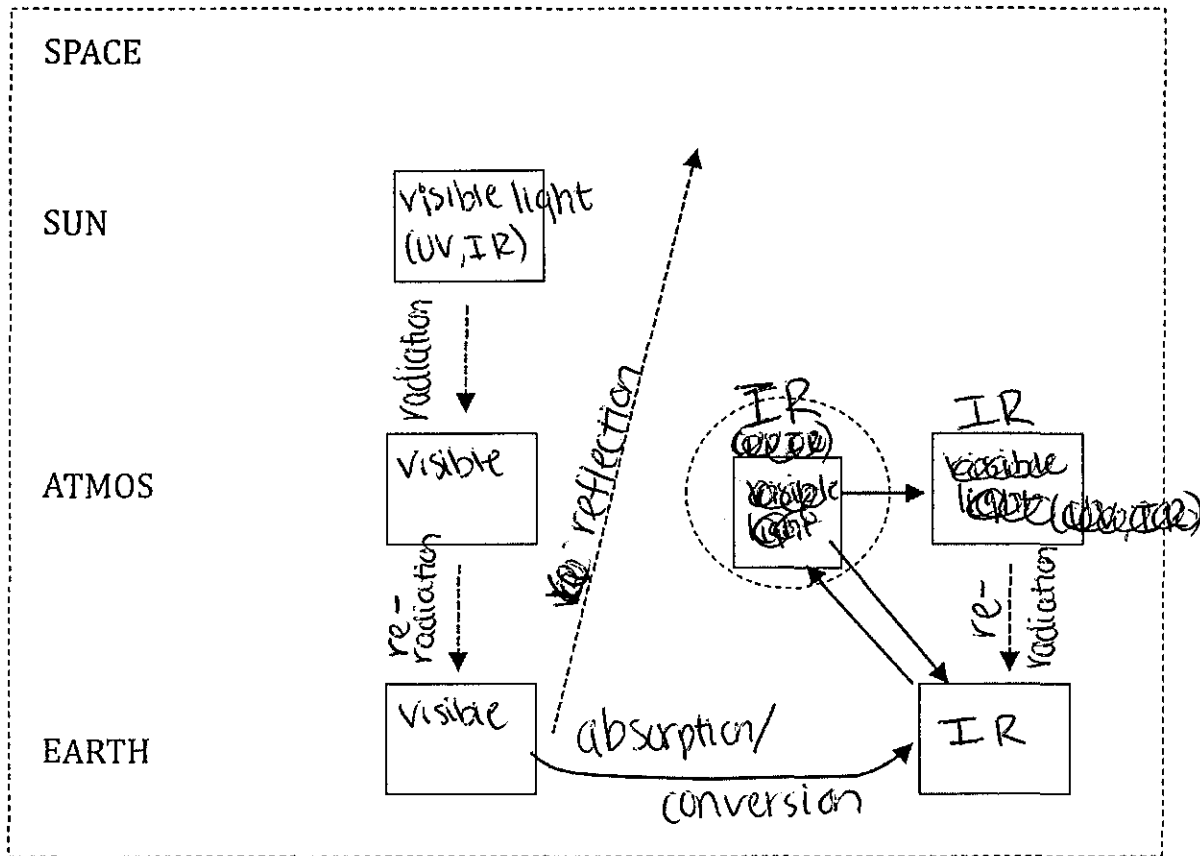
Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	GHG release more heat than glass	Greenhouse Gases

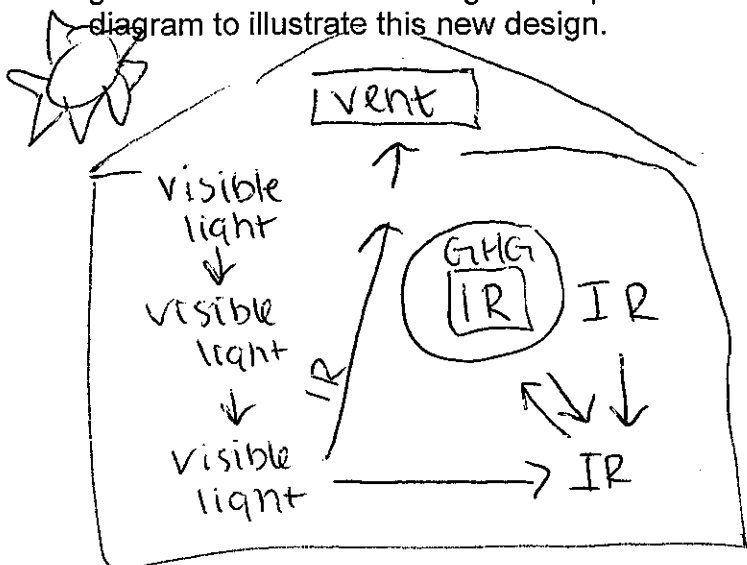
ISP203A – Global Change
Greenhouse Effect

1

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR (Infrared)** energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

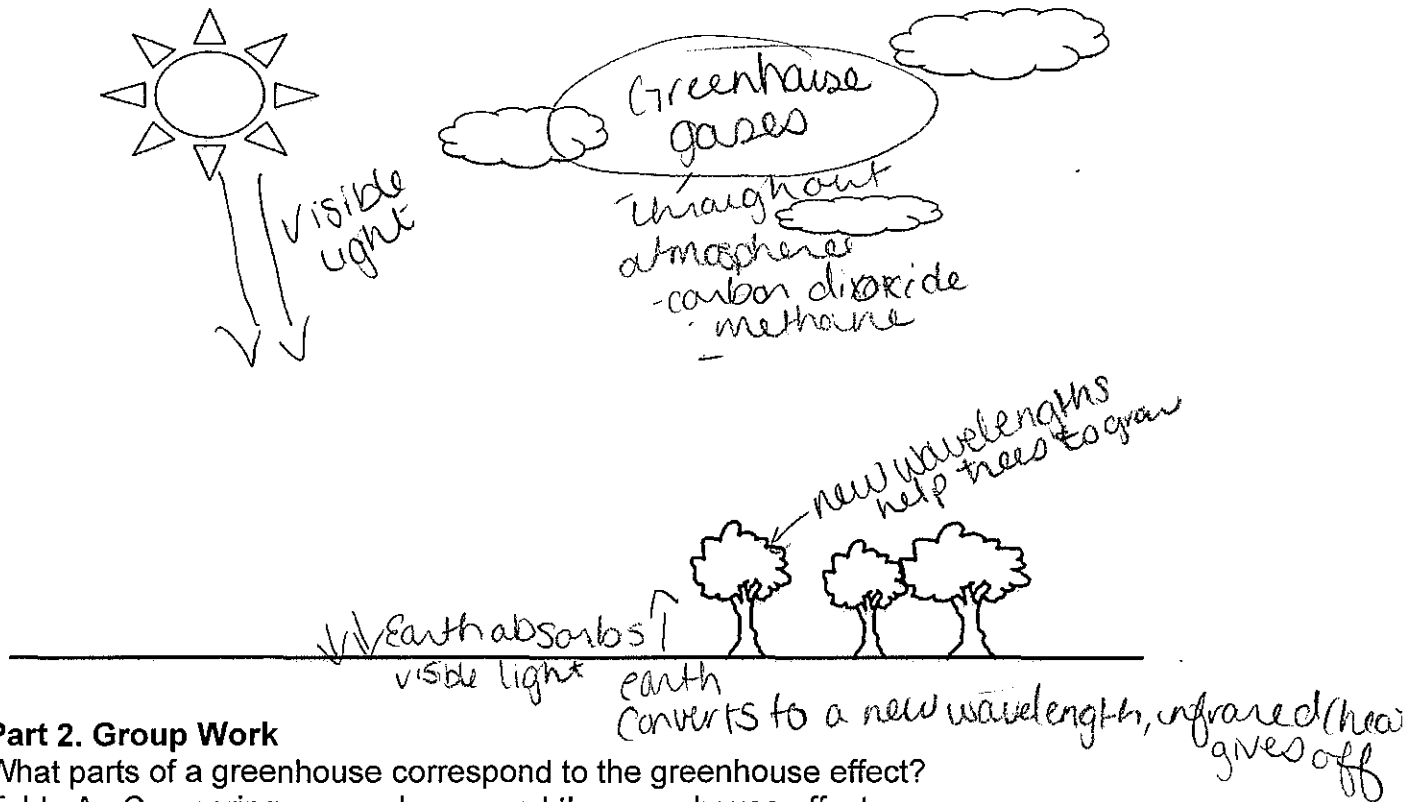
ISP203A – Global Change
Greenhouse Effect

GROUP #: 10
Student IDs of Members Present:

A41823312
A92108428

A39916396

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Greenhouse gases in atmosphere	What traps things
Soil, plants, other surfaces in greenhouse	Earth Surface	absorption
Solar radiation	Visible & UV light	Heat Source
Heat inside greenhouse	heat in atmosphere	Heat
Reflection of visible light off the glass	Infrared bouncing off atmosphere	Reflecting light
Vents in the greenhouse	Hole in atmosphere space	Something escaping, releasing of energy

10

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!

2. Write a complete explanation of the greenhouse effect process in words.

The greenhouse effect is the process by which radiation is absorbed by greenhouse gases in the atmosphere. This causes radiation to move in all directions including the surface. Also causes temperature changes.

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

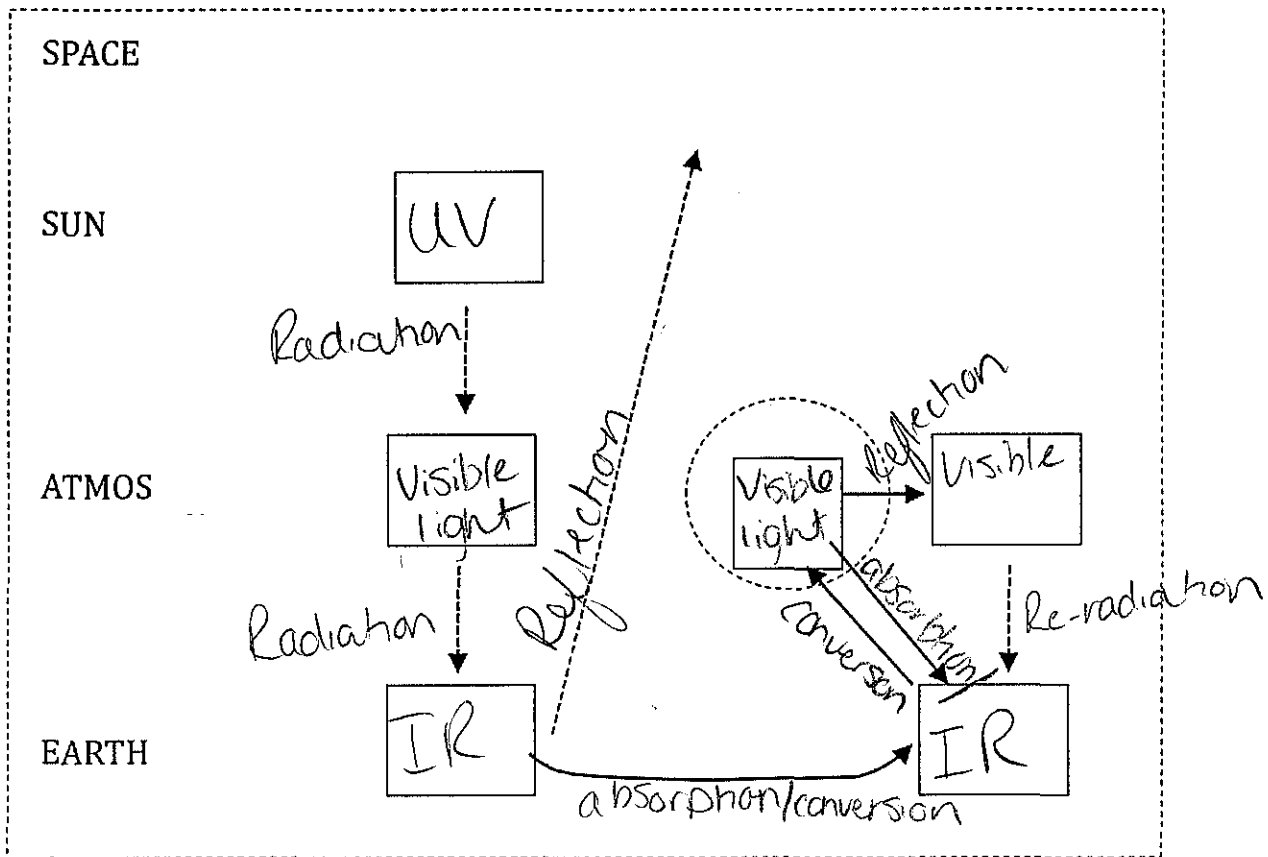
Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	Solid vs gas One is a place where plants are held, the other describes gasses in the atmosphere.	Greenhouse Gases

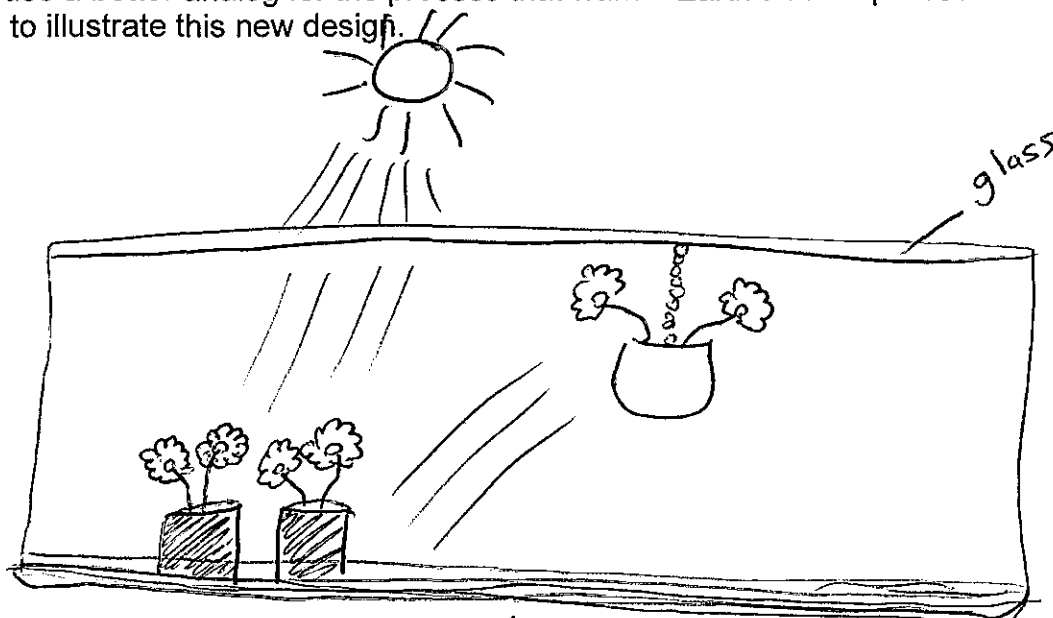
ISP203A – Global Change
Greenhouse Effect

10

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR** (Infrared) energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



Objectives

Upon completing this activity, you will be able to:

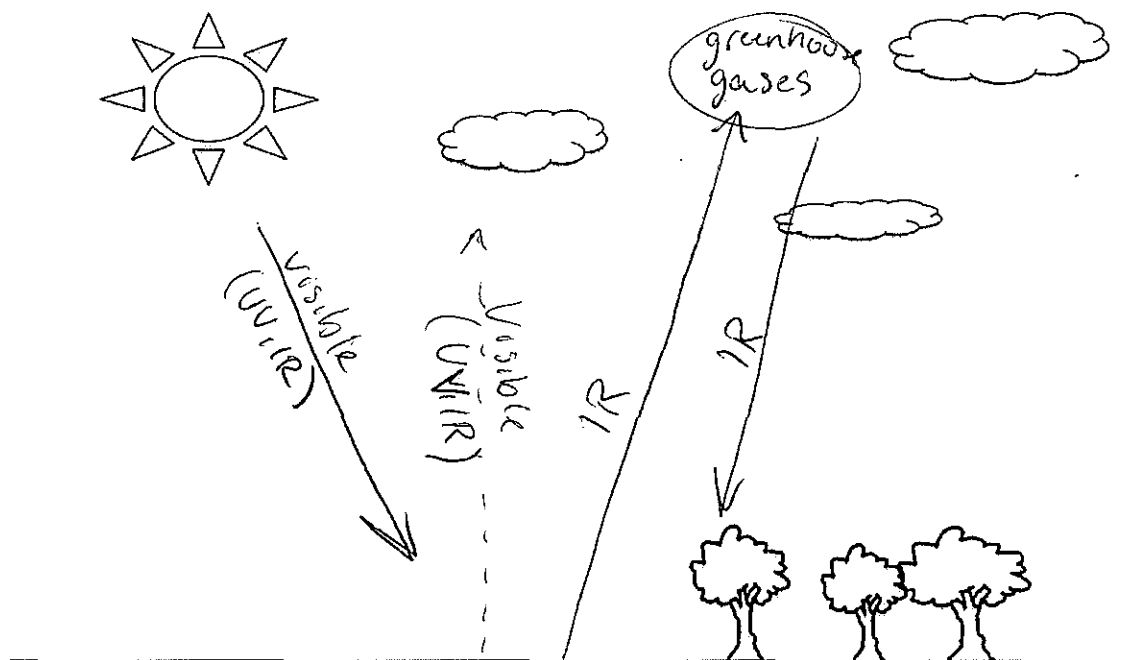
- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	greenhouse gases	
Soil, plants, other surfaces in greenhouse	earth	
Solar radiation	visible light	
Heat inside greenhouse	infrared energy	
Reflection of visible light off the glass	visible light in atmosphere	
Vents in the greenhouse	heat loss space, loss of infrared	

//

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

Sunlight + heat come in, and get trapped by greenhouse gases. Without the greenhouse effect, nights would be too cold and days would be too hot. The Earth absorbs the ~~the~~ visible and UV light and re-radiates the heat to keep our temperature at a more regulated level.

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

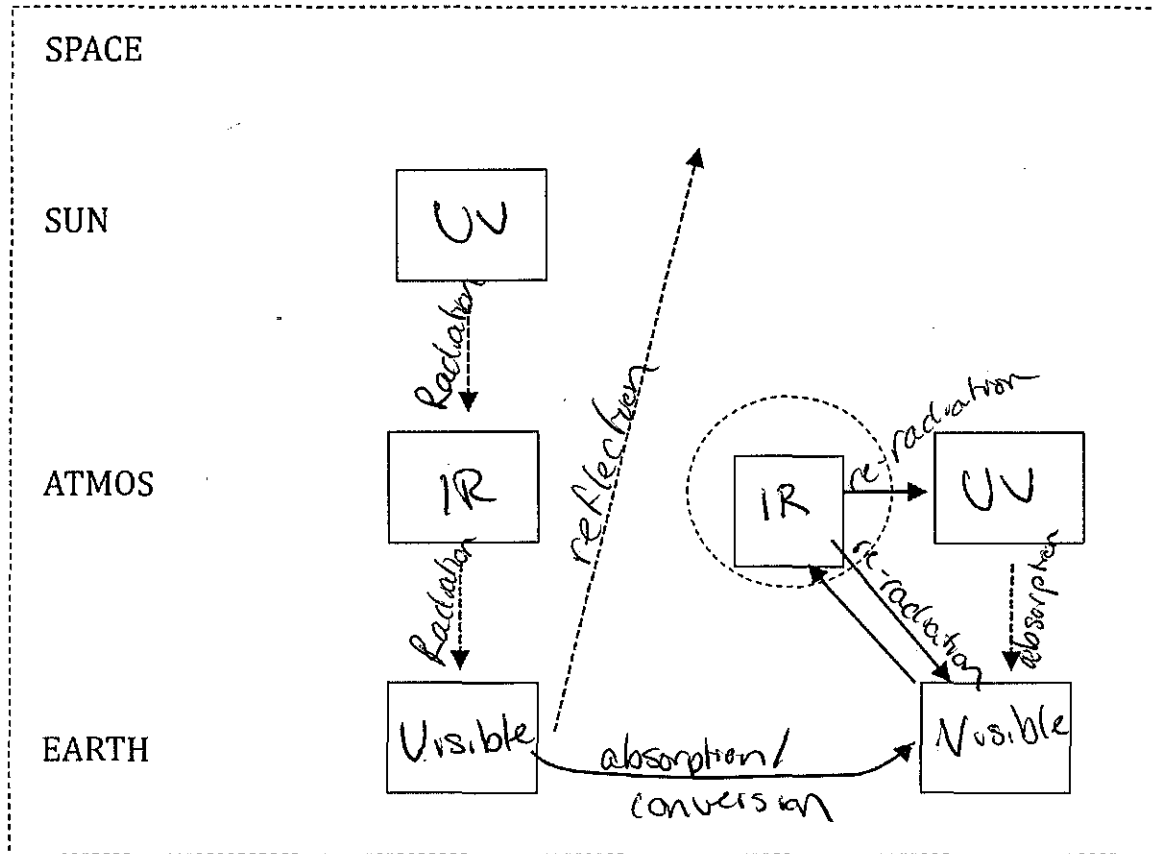
Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	Some greenhouse gases reflect sunlight and other forms of energy	Greenhouse Gases

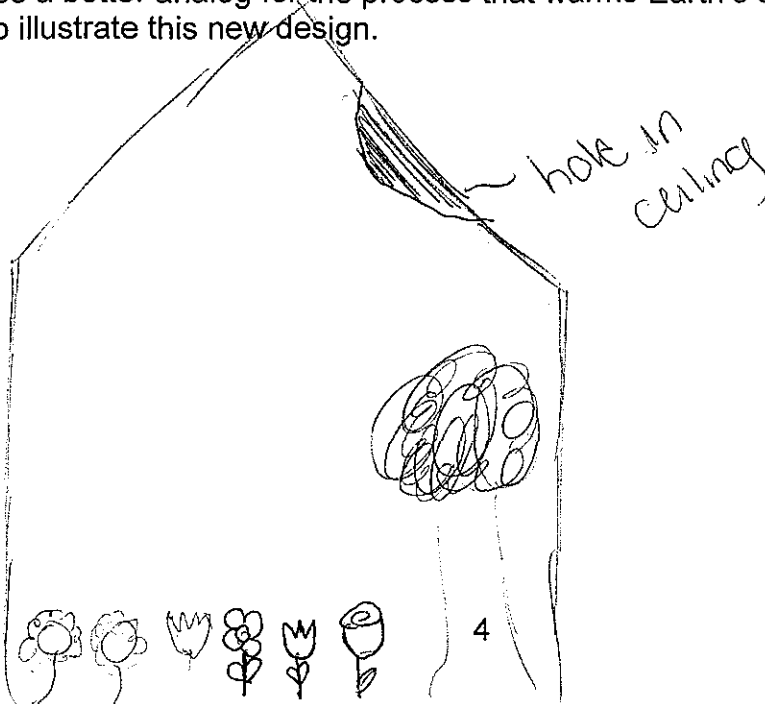
ISP203A – Global Change
Greenhouse Effect

11

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR** (Infrared) energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

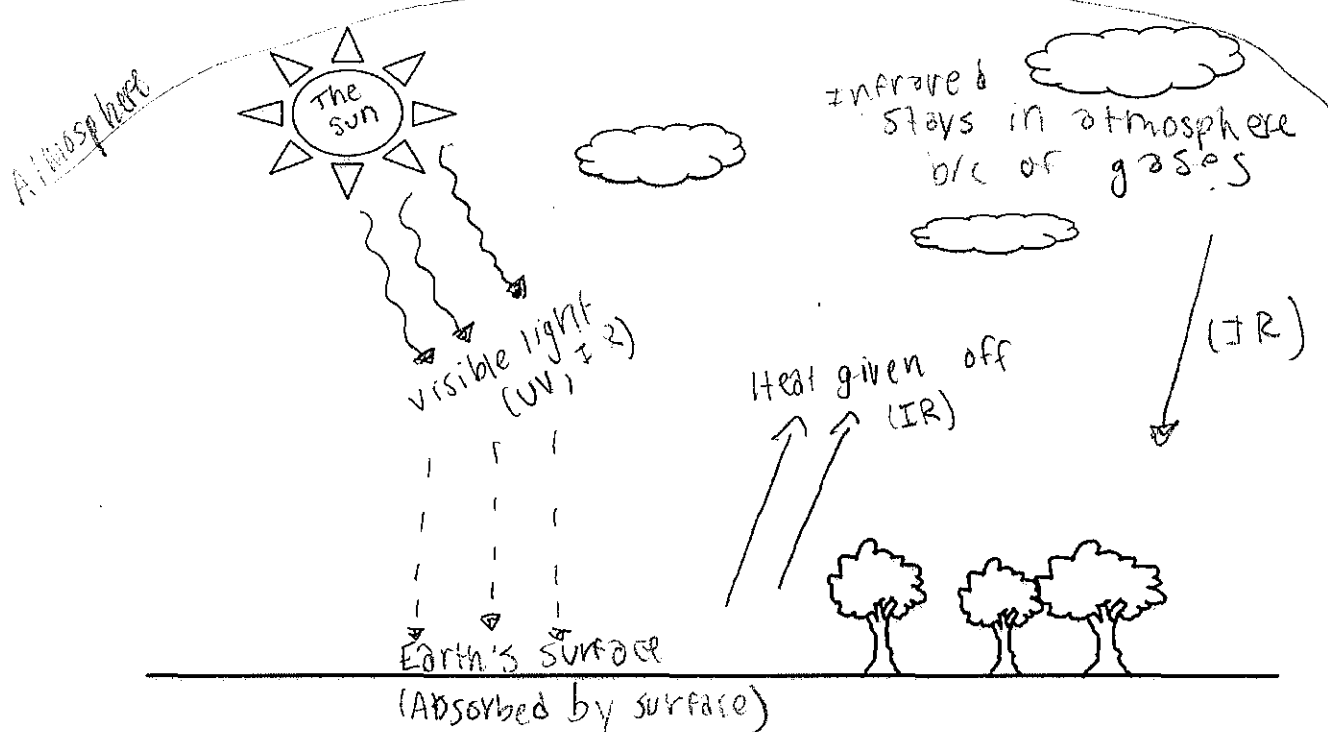
1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

ISP203A – Global Change
Greenhouse Effect

GROUP #: 12
Student IDs of Members Present:
A40920866, A43272425,
A43365634, A43506836

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.

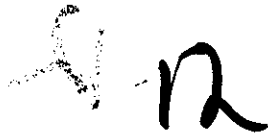


Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Greenhouse gases	Traps infrared heat
Soil, plants, other surfaces in greenhouse	Earth's surface	Absorb heat
Solar radiation	solar radiation	Heat from the sun
Heat inside greenhouse	Heat in Earth's atmosphere	warm surface
Reflection of visible light off the glass	Absorption/re-emittance of infrared	Reflection
Vents in the greenhouse	space (loss of IR)	Allow gases to escape



1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!

2. Write a complete explanation of the greenhouse effect process in words.

The sun, through solar radiation, sends visible light into the Earth's atmosphere. That light is absorbed by the Earth's surface and some, in the form of UV/IR light, is reflected back into the atmosphere.

The greenhouse gases in the upper portion of the Earth's atmosphere trap the IR light and prevent it from leaving the atmosphere. This is the greenhouse effect.

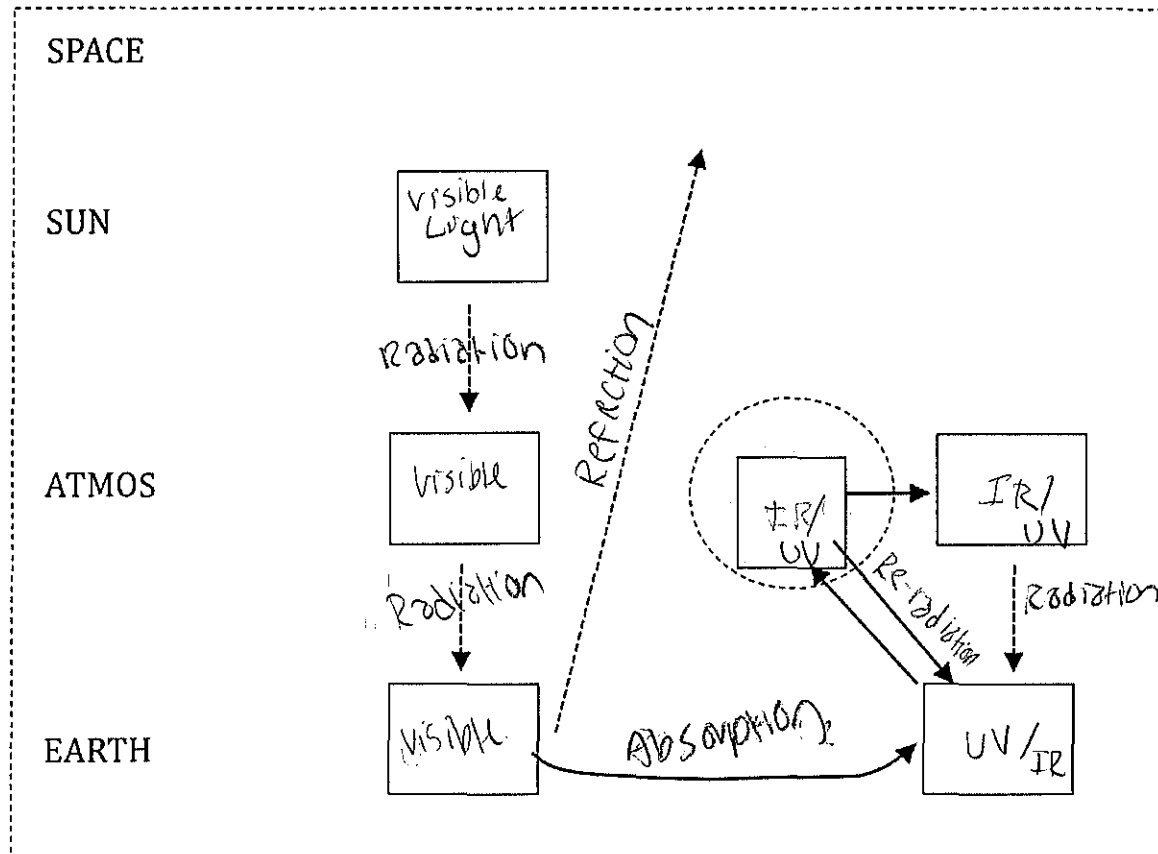
3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

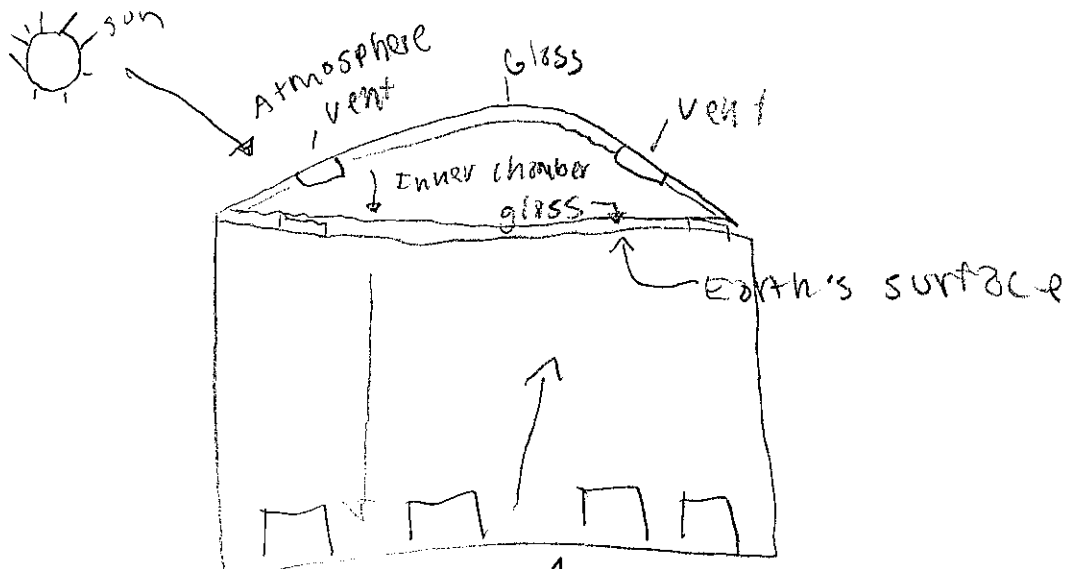
Greenhouse	Difference	Greenhouse Effect
Glass	Glass traps infrared heat and heats the greenhouse up. the gases trap the IR and control the Earth's temp - don't necessarily make it hotter.	Greenhouse Gases

ISP203A – Global Change
Greenhouse Effect

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light, UV, IR (Infrared) energy**
 - Label each arrow with a process: **Radiation, Absorption/Conversion, Reflection, Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



A42957208

A42096024

A43819247

A42097047

A42123279

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

Visible light enters through the greenhouse gases into the Earth's atmosphere. Once the light reaches the Earth's surface, it turns into infrared light and bounces back towards the greenhouse gases. Infrared light does not seep through said gases as easily as visible light, so it remains stuck in the atmosphere and warms the planet's temp.

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

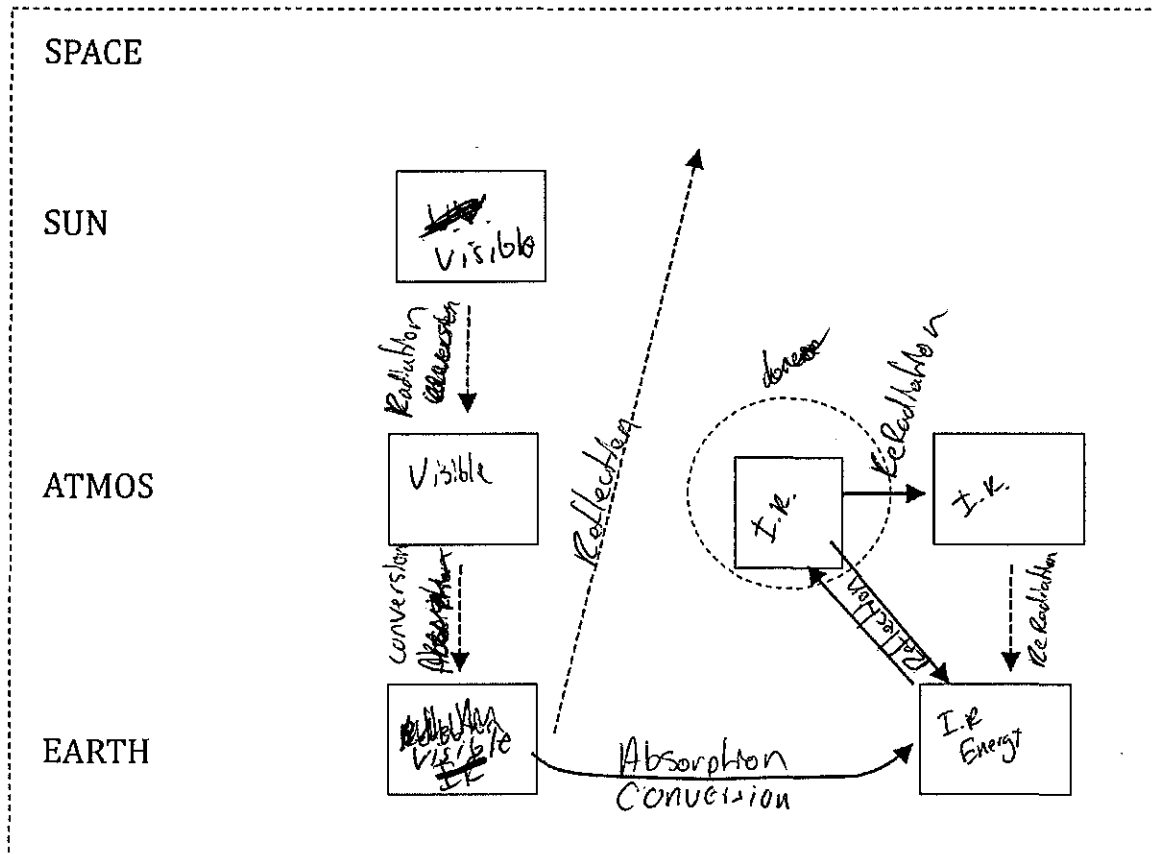
Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	the GreenHouse is glass and finite and solid. The ozone is more fragile and is able to split and move	Greenhouse Gases

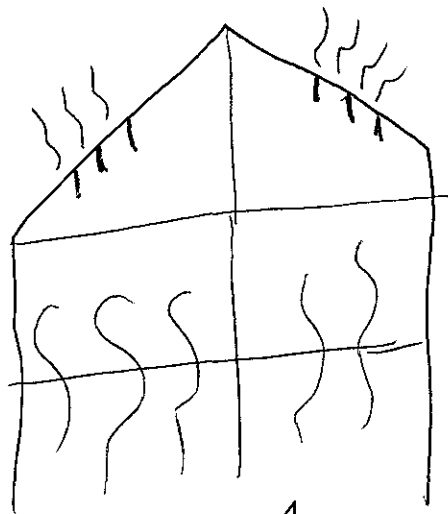
ISP203A – Global Change
Greenhouse Effect

13

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light, UV, IR (Infrared) energy**
 - Label each arrow with a process: **Radiation, Absorption/Conversion, Reflection, Re-Radiation**

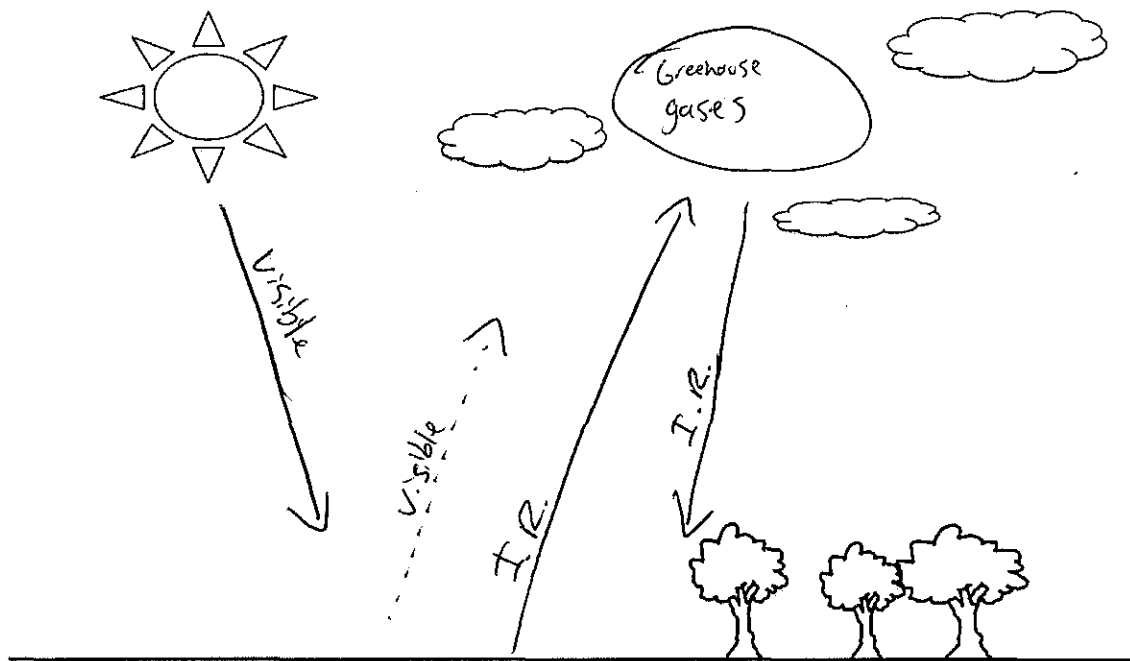


5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



To make the Greenhouse
a better Analog for the
warming process, we would
add vents and make sure
can can control the heat.

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Greenhouse Gases	Regulates light & radiation
Soil, plants, other surfaces in greenhouse	Vegetation on Earth	absorbs & reflects I.R.
Solar radiation	Solar Radiation	adds provides visible light
Heat inside greenhouse	temp on earth	Heats up
Reflection of visible light off the glass	Visible light reflected off greenhouse gases	
Vents in the greenhouse	holes in Atmosphere	



ISP203A – Global Change Greenhouse Effect

Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

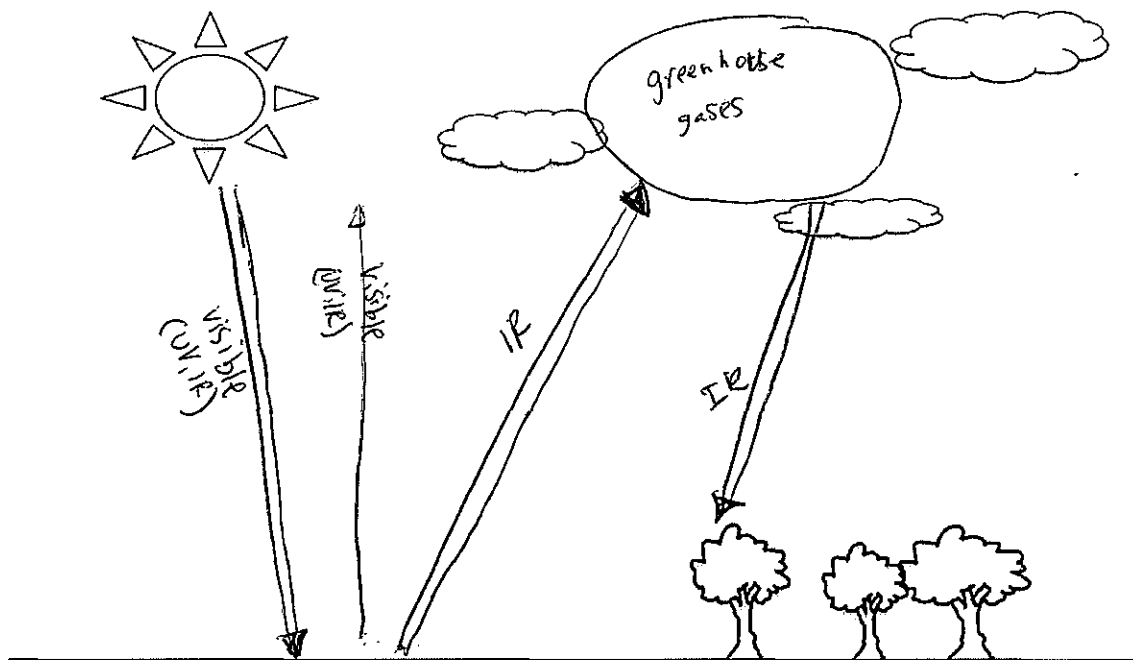
1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

ISP203A – Global Change Greenhouse Effect

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.

GROUP #: 14
Student IDs of Members Present:
A43424499
A39222014
A43219269
A43376720



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	greenhouse gases	Keep mass ^{matter} enclosed
Soil, plants, other surfaces in greenhouse	reflect	reflect + absorb
Solar radiation	visible (uv, IR)	heat, light solar radiation
Heat inside greenhouse	area below greenhouse gases	matter enclosed, heat in atmosphere
Reflection of visible light off the glass	reflection of earth's surface	Reflection takes place absorption + re-emittance
Vents in the greenhouse	gaps in greenhouse gases	so matter escapes (loss of infrared)

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

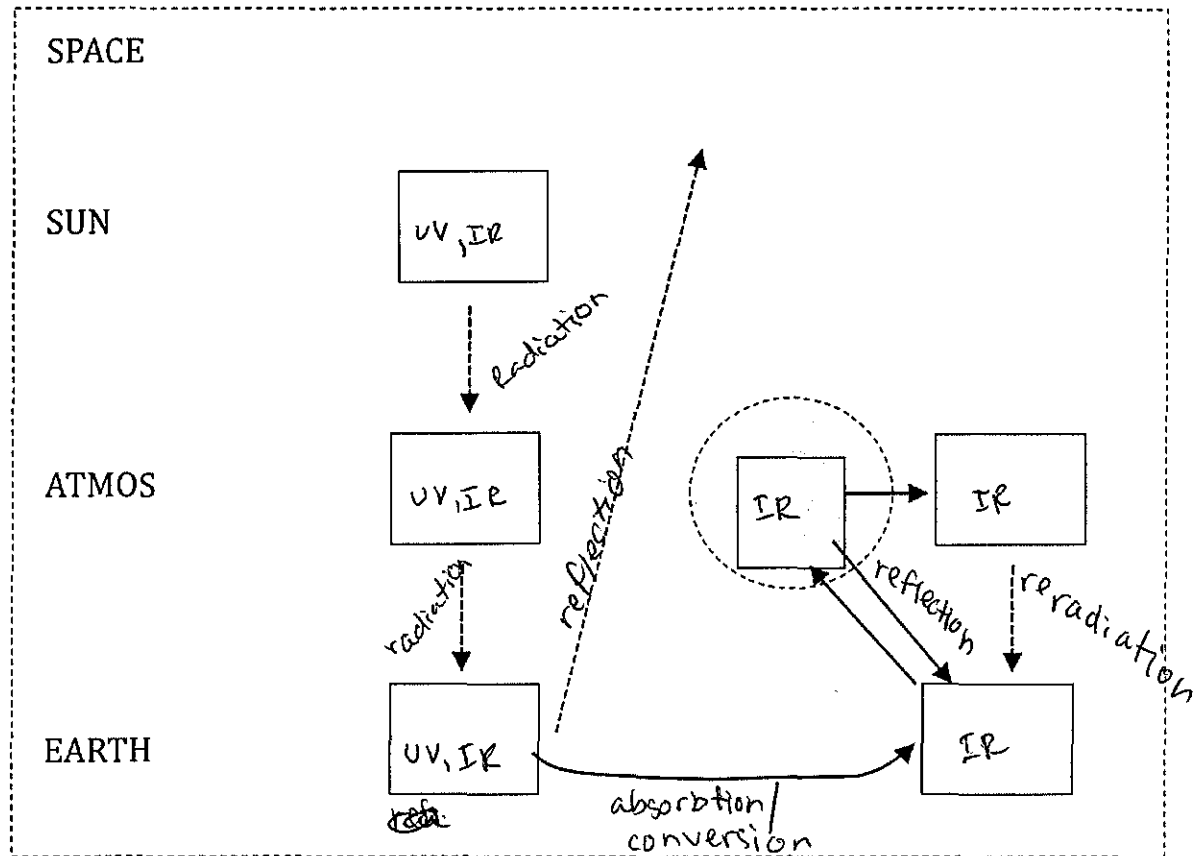
visible (UV, IR) light is produced/maintained by the sun. Visible light is reflected back to atmosphere and other parts are absorbed and turned to IR light. The IR light is reflected by the greenhouse gases and is between the greenhouse gases and the earth's surface. Some IR light does escape.

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	G.E. is large scale G.E. has positive & negative effects	Greenhouse Gases

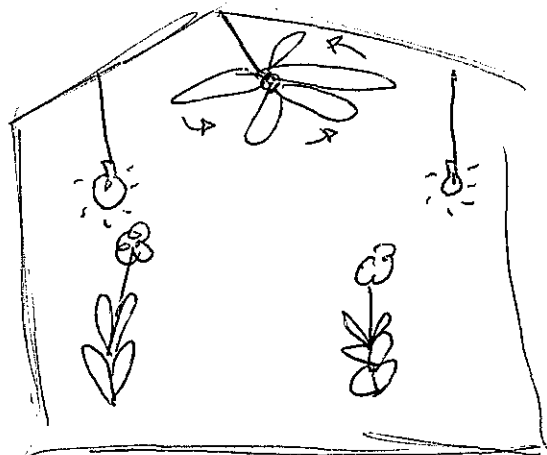
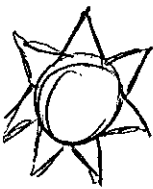
4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light, UV, IR (Infrared)** energy
 - Label each arrow with a process: **Radiation, Absorption/Conversion, Reflection, Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.

fans in G.H.

infrared lights



14

Part 3: Homework

If you complete the group work, you may work on the homework on your own. This means your answers should be generally unique from other students' answers. **Submit your homework using ANGEL.**

1. Where would the heat radiated by the Earth go if greenhouse gases did not exist?

further out in atmosphere = very cold at night

2. What would happen to the temperature of the atmosphere if you were to increase the amount of greenhouse gas in the atmosphere?

It would stay really warm @ night

- no cool down

3. Imagine you were having a conversation with someone who said the greenhouse effect is the cause of global warming. Write a response to this statement that is scientifically correct based on what you have learned in this class and activity.

No, because thanks to G.H. gases the earth remains cool at night

33

Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

- radiation - heat transfer (electromagnetic waves)
- convection - heat transfer (mvmt. of matter)
- conduction - heat transfer (atoms/molecules by ^{close} physical contact)

ISP203A – Global Change Greenhouse Effect

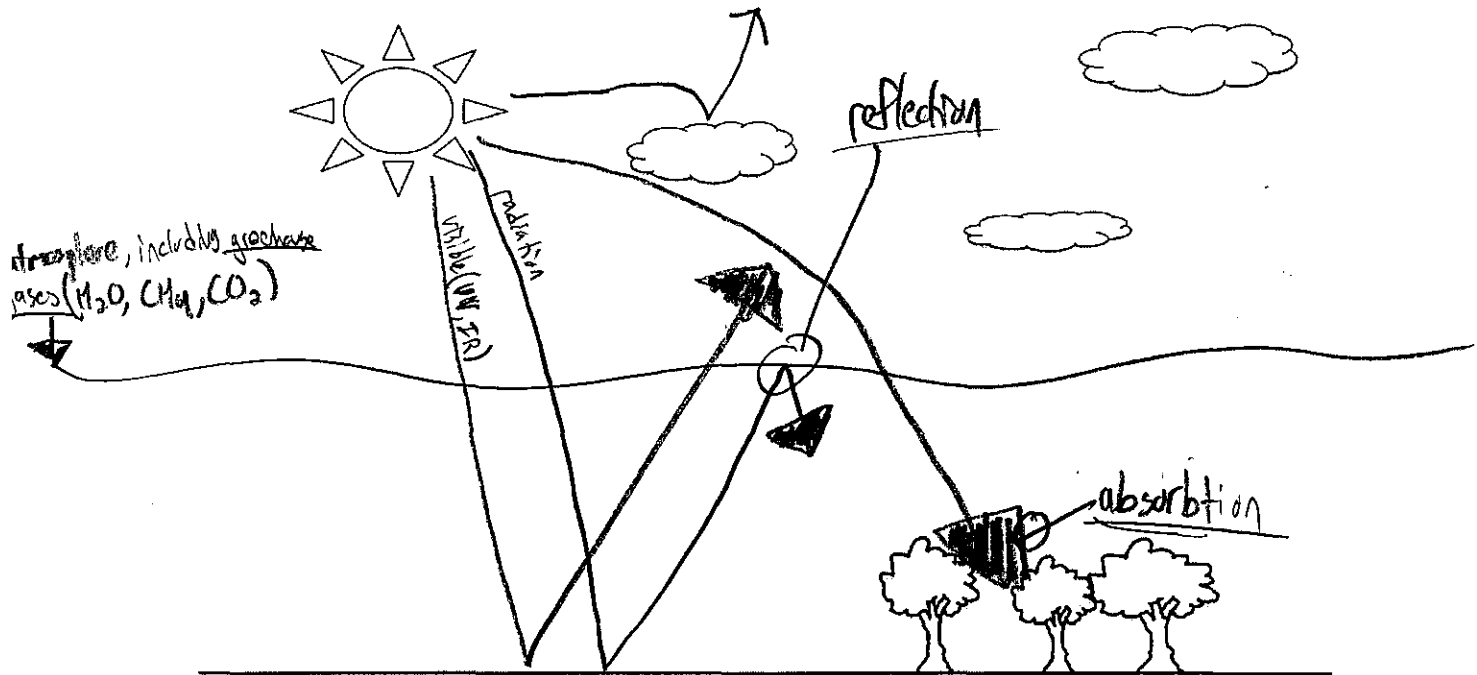
GROUP #: 15
Student IDs of Members Present:

██████████ - A42669701

██████████ - A41021960

██████████ - A40641748

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	H_2O, CH_4, CO_2 - GH gases	reflection, retains heat in atmosphere
Soil, plants, other surfaces in greenhouse	Earth surface - land, water	absorption
Solar radiation	infrared radiation	heats Earth
Heat inside greenhouse	heat retained by Earth's atmos	absorbed by Earth
Reflection of visible light off the glass	radiation reflected off of Earth (clouds)	reflection - Earth's clouds
Vents in the greenhouse	radiation that escapes and isn't absorbed	allows some radiation to escape

21
15

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

Solar rad. travels from Sun to Earth, mostly visible. Earth absorbs most but some is reflected by Earth surface. Radiation is re-radiated by the Earth as infrared radiation. Greenhouse gases (H_2O , CH_4 , CO_2) reflect this infrared light on Earth.

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	glass - reflects rad. G.H. gases - absorbing/re-rad.	Greenhouse Gases

4. *Chlorophyll a* and *Chlorophyll b* contents were determined by spectrophotometry using the method of Lichtenthaler and Wherry (1987).



- WS

Rad



Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

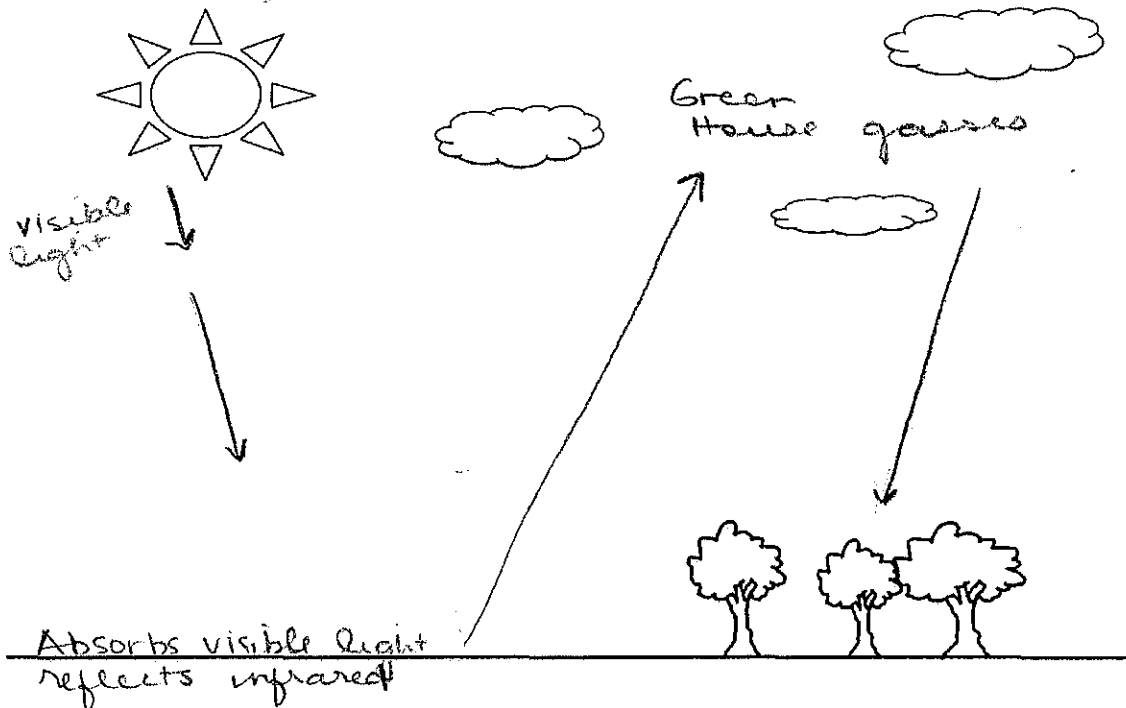
PART 1: Background Notes

ISP203A – Global Change
Greenhouse Effect

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.

GROUP #: **16**
Student IDs of Members Present:

43145662 - [REDACTED]
40974797 [REDACTED]
37497963 [REDACTED]
41944159 [REDACTED]



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Variable gases water vapor, CO ₂ , methane	traps heat
Soil, plants, other surfaces in greenhouse	Earth's surface plants soil, etc.	Absorb and reflect heat (infrared)
Solar radiation	Solar Radiation	Visible light, some UV & IR
Heat inside greenhouse	Heat in the atmosphere	moderate temperature
Reflection of visible light off the glass	surface of earth	Absorption and re-emittance of infrared
Vents in the greenhouse	Gaps in greenhouse gases?	release trapped heat

31
16

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!

2. Write a complete explanation of the greenhouse effect process in words.

The greenhouse effect is the process in which solar energy in the form of visible light and small amounts of UV and IR. When the visible light reaches the earth's surface most of it is absorbed but some is converted to IR and reflected back into the atmosphere. Variable gases including CO₂, water vapor, and methane molecules trap IR and generate heat. The greenhouse effect acts to moderate temperature however more greenhouse gases can mean an increase in IR and thus an increase in temperature.

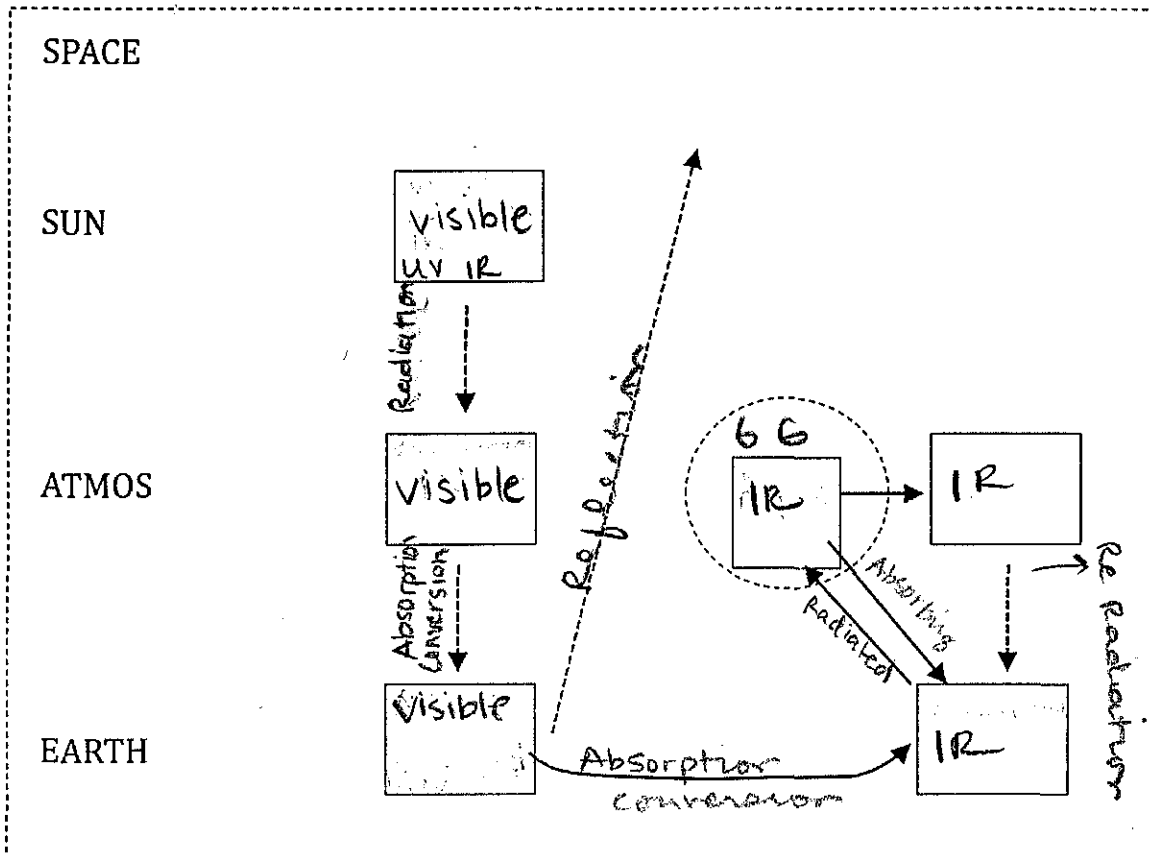
3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

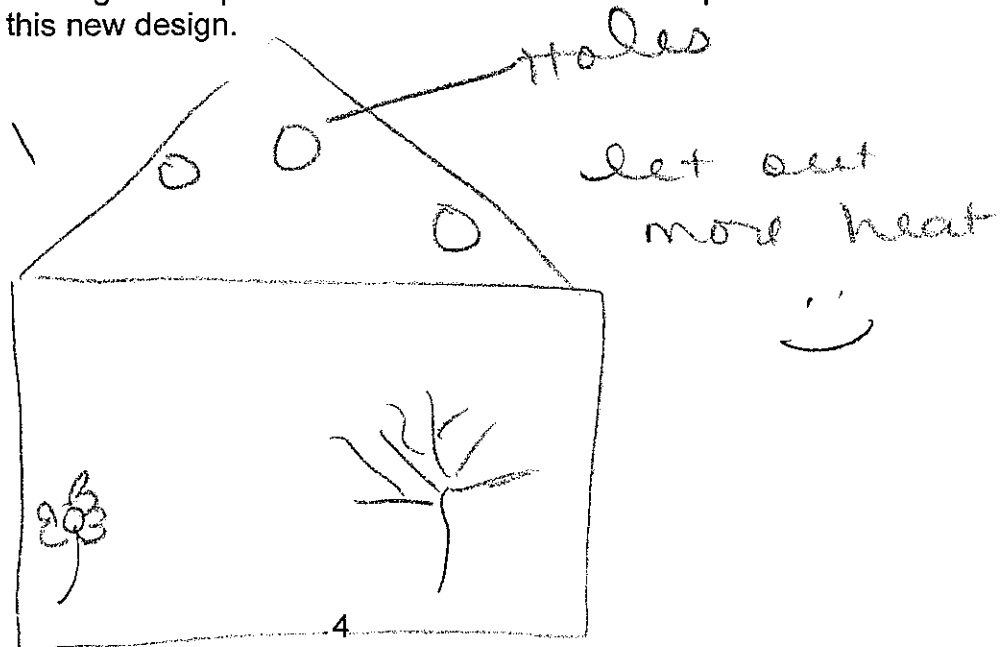
Greenhouse	Difference	Greenhouse Effect
Glass	Conduct heat differently	Greenhouse Gases

16

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR** (Infrared) energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

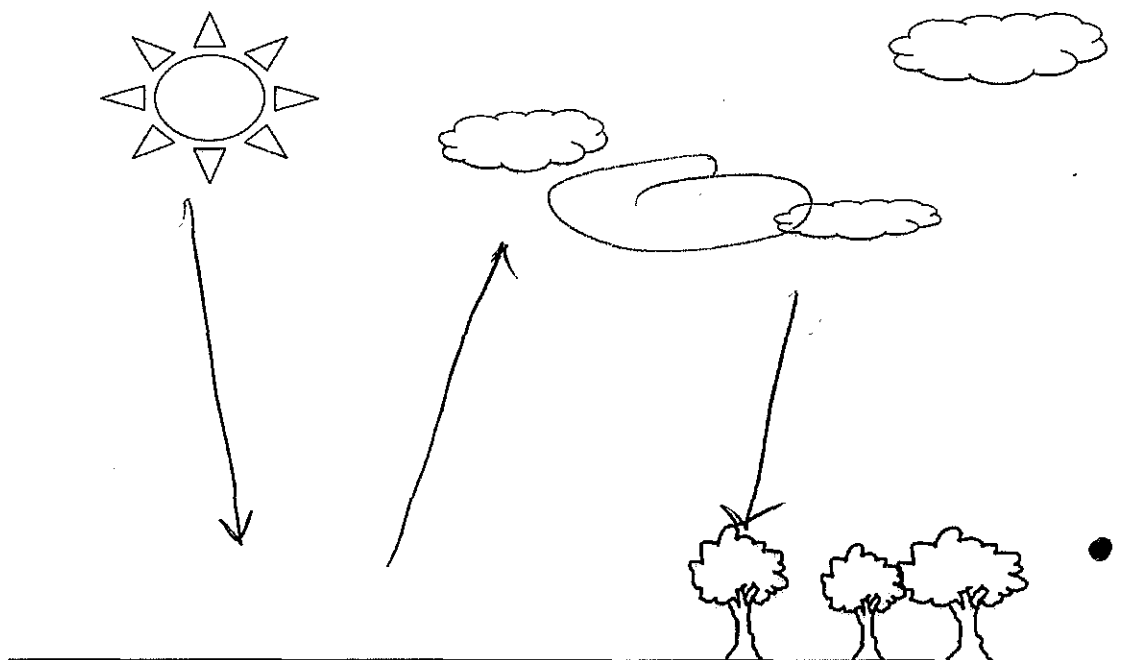
ISP203A – Global Change
Greenhouse Effect

GROUP #: 17
Student IDs of Members Present:

A41727610

A42503261

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Gasses	Trap ^{IR} heat in
Soil, plants, other surfaces in greenhouse	Soil/ land	The object getting heated
Solar radiation	Infrared light	what is warms the plants/Earth
Heat inside greenhouse	Heated air in air	What is being created
Reflection of visible light off the glass	Ultraviolet light	What is seen in the process
Vents in the greenhouse	Heated in gas - Air space	Lets some heat escape

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

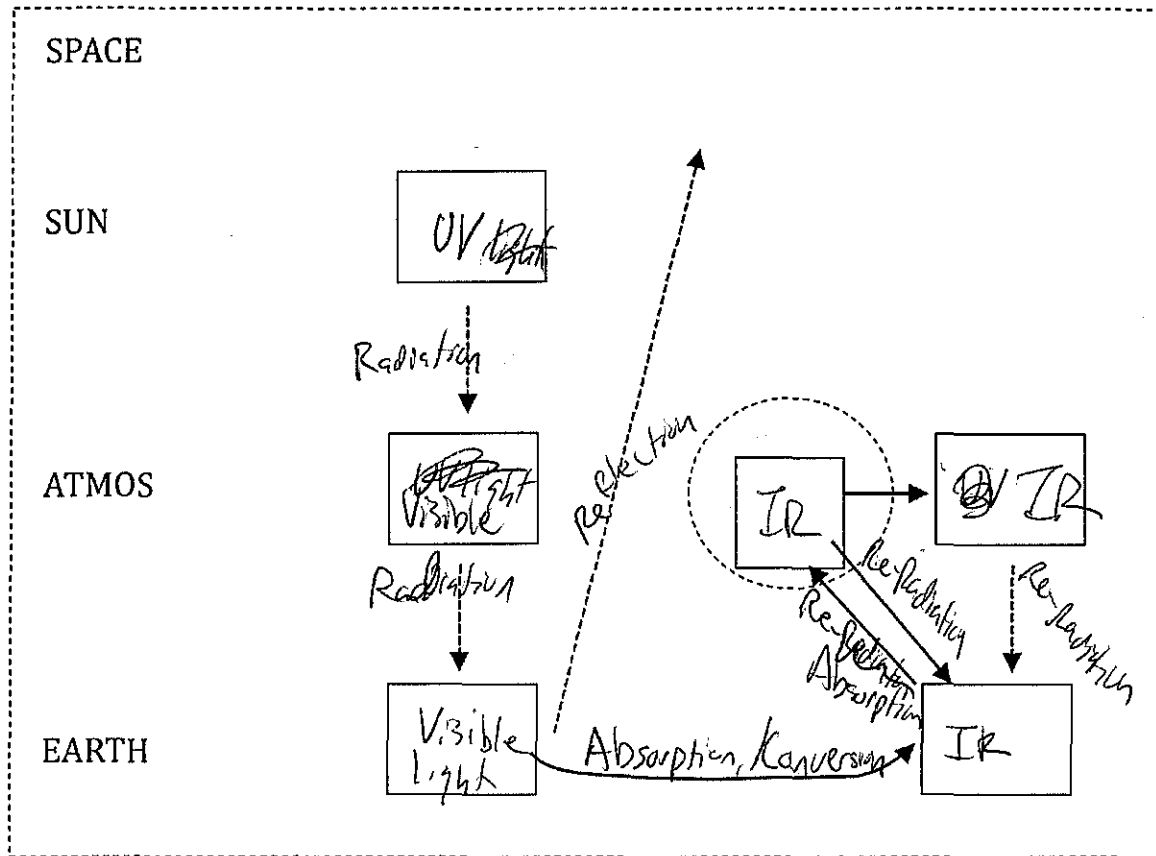
The greenhouse effect is a process in which thermal radiation is radiated back on to the substance that radiated it. Solar light comes down on to the earth, and infrared rays are absorbed into the soil. As the infrared rays are re-admitted out of the soil, gases in the atmosphere absorb the rays and re-radiate the infrared rays onto the soil, creating heat.

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

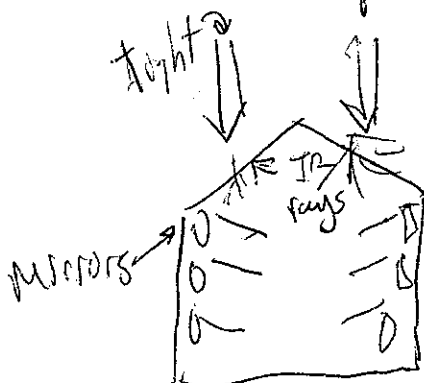
Greenhouse	Difference	Greenhouse Effect
Glass	Gas can be removed	Greenhouse Gases

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR** (Infrared) energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.

I would line the greenhouse with mirrors so reflection would occur, forcing the IR rays inward towards the plants



Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

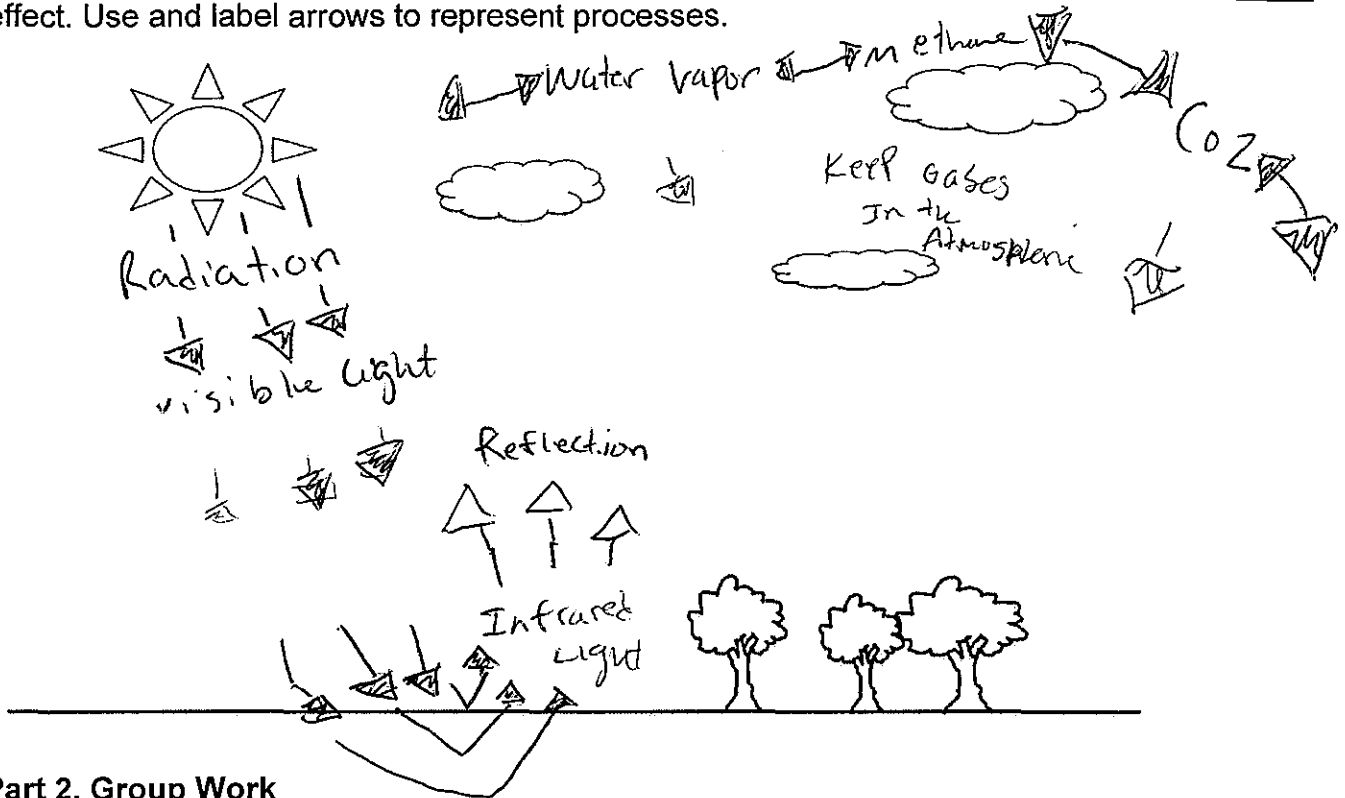
1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

- Carbon Dioxide
- Ozone
- Plants
- Too many fossil fuels - related to CO_2
- Carbon Dioxide methane + Greenhouse gases are less than 3% of units in the air

16

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Reflection Green house Gases	Lets in Mostly visible Light + Trap heat
Soil, plants, other surfaces in greenhouse	Plants soil on Earth convection/Absorption	Reflection Reflects mostly Infrared light
Solar radiation	Radiation Reflection from Sun	Heats up the Atmosphere
Heat inside greenhouse	Temp of Earth surface Infrared light	Contribute to temperature.
Reflection of visible light off the glass	Sun Ray of the air Atmosphere into space	Atmosphere keeping out U.V. Rays
Vents in the greenhouse	Thin spots in the Green house gases	Lets out some Infrared light

18

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

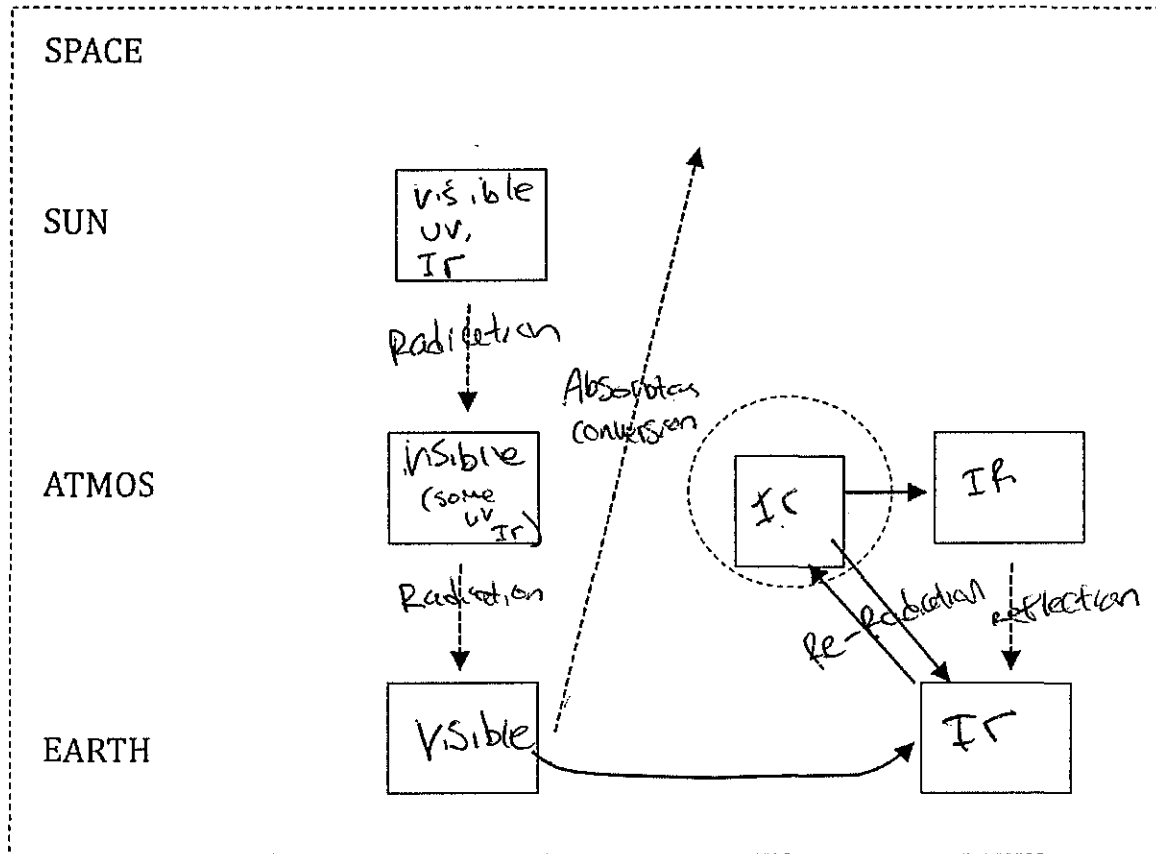
The Sun gives off Radiation. The Atmosphere lets in Mostly visible light. Most of that is absorbed by the Surface, then the Surface gives off ~~UV rays~~ Infrared light (Heat). The greenhouse gases ~~then~~ (CO_2 , methane, water vapor) then trap the infrared light. This light bounces around the atmosphere heating up the air. Acting like a green house

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

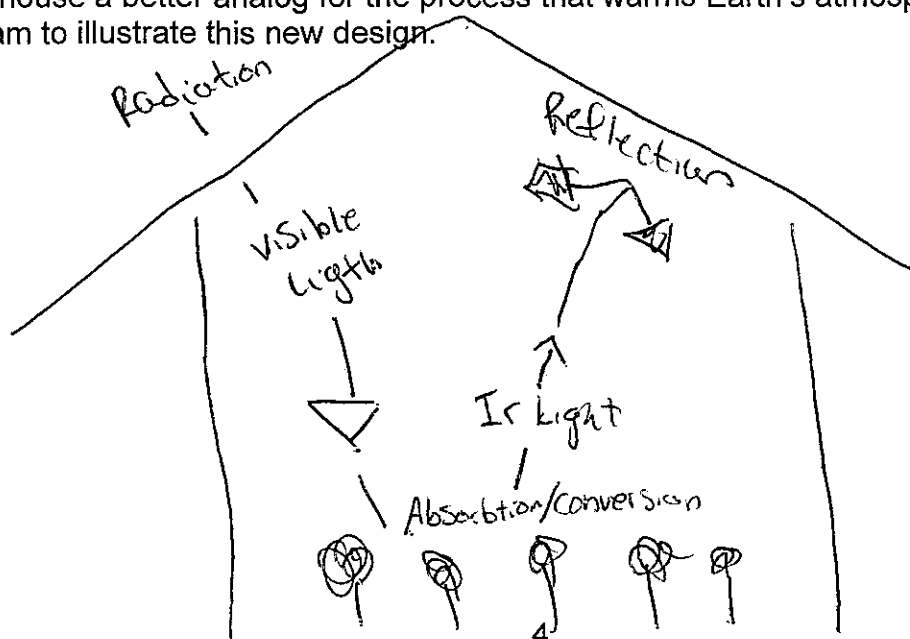
Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	- The glass will reflect more of the light than will the greenhouse gases. The gases may actually absorb some of it.	Greenhouse Gases

4. Complete the simple box-and-arrow diagram below:
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light, UV, IR** (Infrared) energy
 - Label each arrow with a process: **Radiation, Absorption/Conversion, Reflection, Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

NITROGEN = 78% OF THE ATMOSPHERE
- OXYGEN = ONLY 20%.

- RADIATION - VISIBLE LIGHT, CAL HEAT

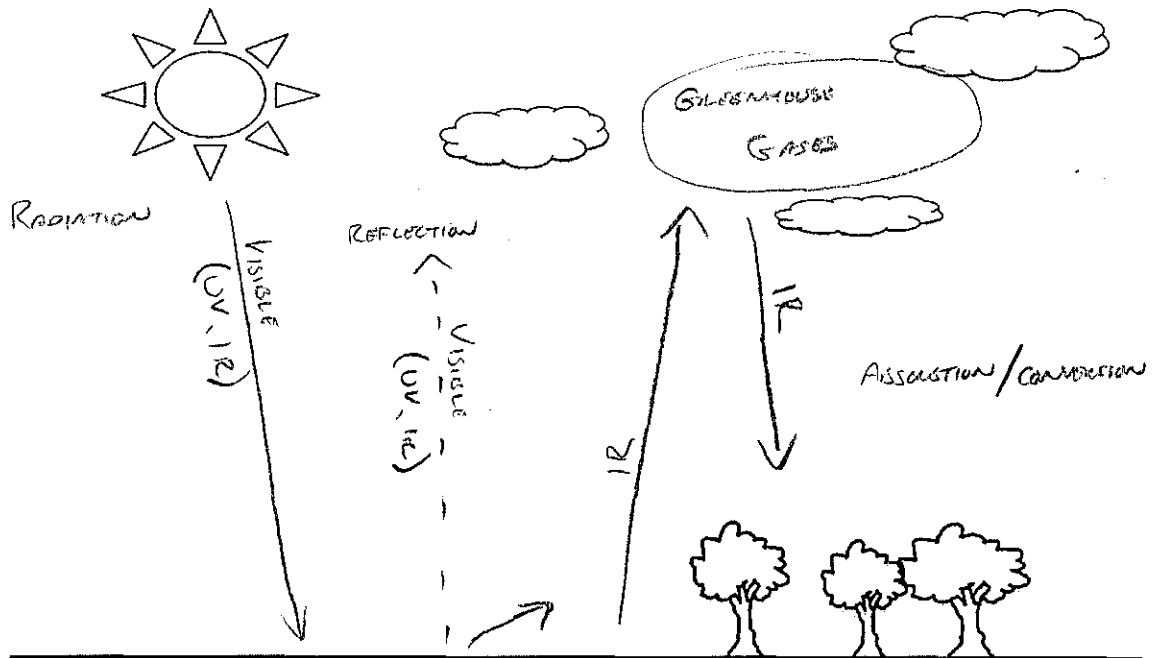
- CONVECTION - CIRCULATION OF HEAT IN THE OCEAN / ATMOSPHERE

- CONDUCTION - HEAT ENERGY TRANSFERRED THROUGH OBJECTS.

ISP203A – Global Change
Greenhouse Effect

GROUP #: 19
Student IDs of Members Present:
A422574159
A41960512
A40212800
A40749278

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	GREENHOUSE GASES	TRAP-IN HEAT & MOISTURE, BUT NOT LIGHT.
Soil, plants, other surfaces in greenhouse	→ PLANTS, SOIL, TREES, ETC.	ABSORB &/OR CONVERT LIGHT/HEAT ENERGY.
Solar radiation	→	HEATING
Heat inside greenhouse	INFRARED RADIATION HEAT IN ATMOSPHERE.	IS THE HEAT, TEMPERATURE.
Reflection of visible light off the glass	REFLECTION OF LIGHT/ENERGY FROM SURFACE + ATMOSPHERE (GASES)	ABSORPTION & RE-EMITTANCE OF INFRARED BY GREENHOUSE GASES.
Vents in the greenhouse	ATMOSPHERE	ALLOW FOR TEMPERATURE REGULATION.

ISP203A – Global Change Greenhouse Effect

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!

2. Write a complete explanation of the greenhouse effect process in words.

VISIBLE LIGHT, UV LIGHT + IR COMES TO THE EARTH FROM THE SUN, WHICH PROVIDES FOR LIGHT + HEAT FOR THE PLANET. SOME OF THIS ENERGY IS REFLECTED FROM THE SURFACE OF THE BATH, OCEANS, ETC. BACK INTO THE ATMOSPHERE, WHICH HELPS FOR TEMPERATURE REGULATION. MOST OF IT IS ABSORBED BY PLANTS, ETC. OR REFLECTED + TRAPPED BY THE GREENHOUSE GASES TO ALSO ALLOW FOR TEMPERATURE REGULATION.

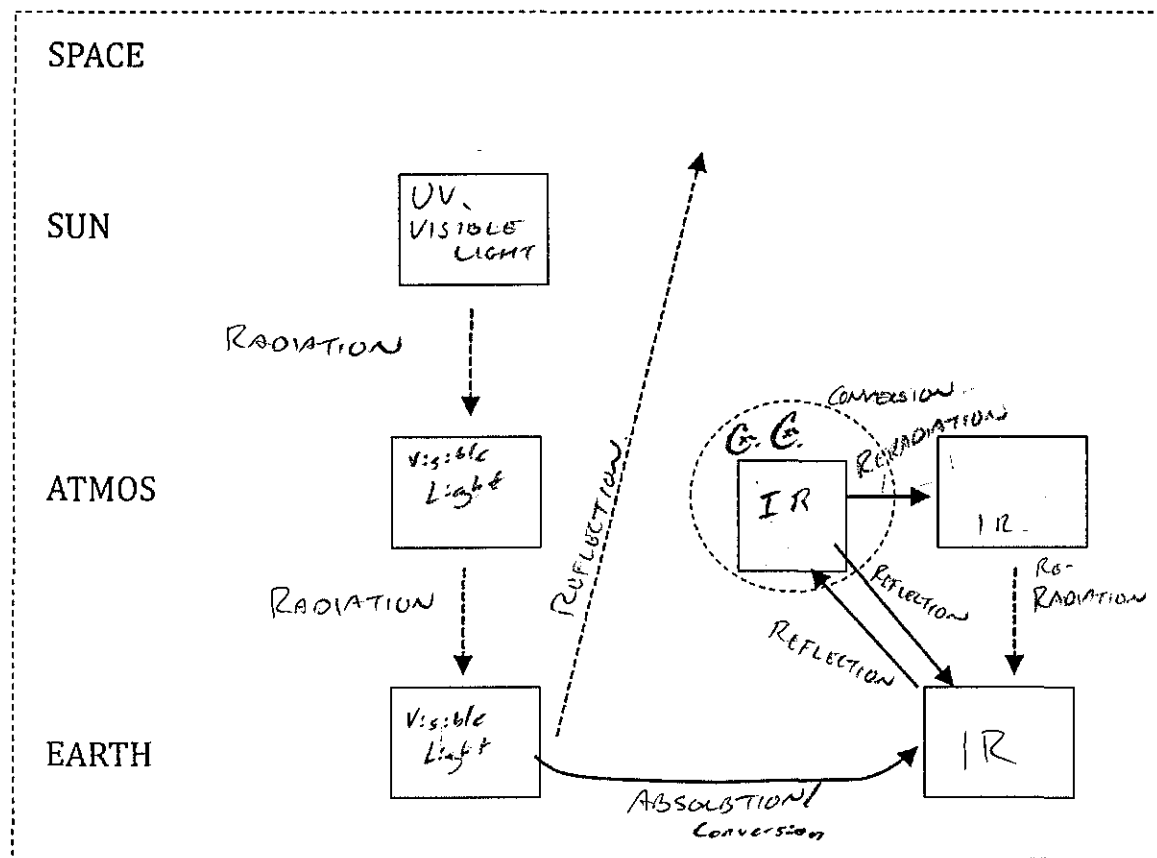
3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	Glass is a solid, and heat will travel through it differently than through gases. As a solid (or liquid), glass will conduct more heat than gases.	Greenhouse Gases

ISP203A – Global Change
Greenhouse Effect

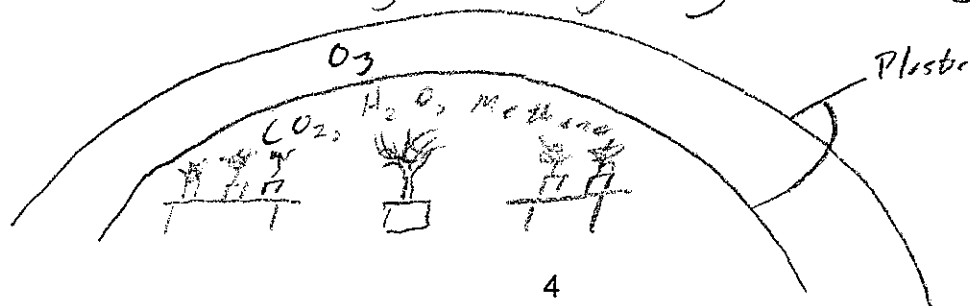
4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light, UV, IR (Infrared) energy**
 - Label each arrow with a process: **Radiation, Absorption/Conversion, Reflection, Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.

First, I would make the structure be plastic bubbles containing CO_2 , methane and water vapor, which would allow the heat to radiate more similarly to how it does in the process of Earth.

Would also add another layer which would have ozone in it, which would keep UV light from getting into the greenhouse.



ISP203A – Global Change
Greenhouse Effect

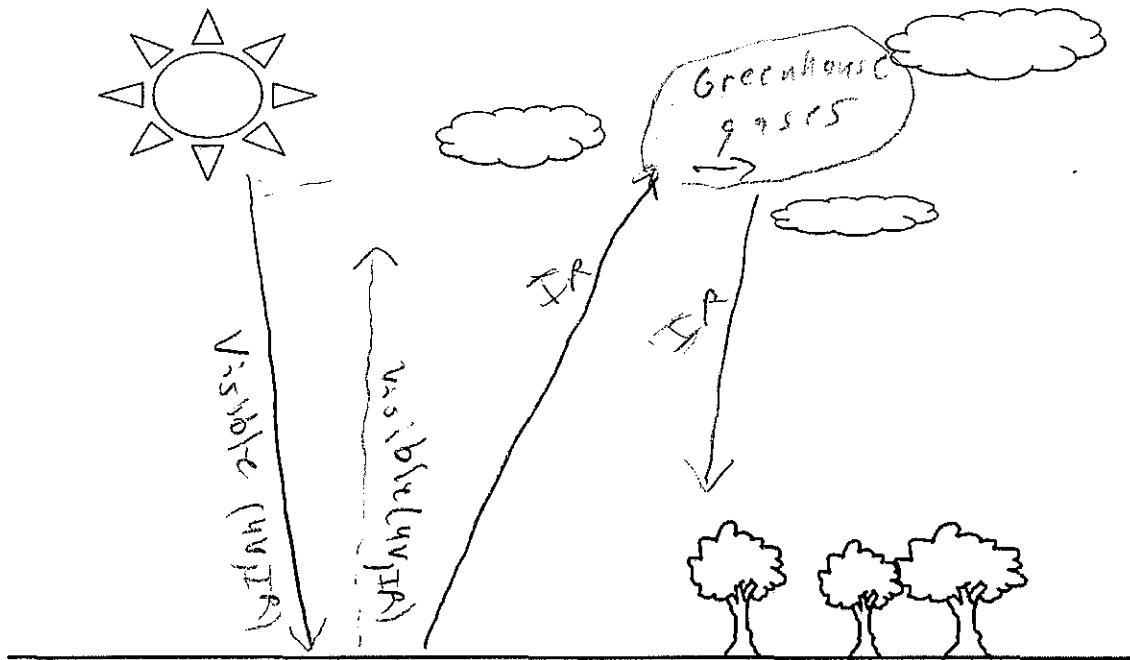
GROUP #: 20
Student IDs of Members Present:

A43332855

A1860835

A41918010

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	greenhouse gases	trap infrared heat
Soil, plants, other surfaces in greenhouse	earth's surface	absorbing and re-radiating heat
Solar radiation	Sun (visible light)	radiates light
Heat inside greenhouse	infrared (heat) inside atmosphere	trapped inside and heats earth
Reflection of visible light off the glass	infrared by gases	reflects and traps infrared heat
Vents in the greenhouse	space	lets some visible light out

ISP203A – Global Change
Greenhouse Effect

Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

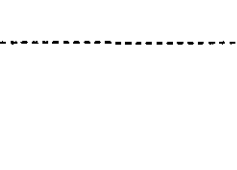
Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

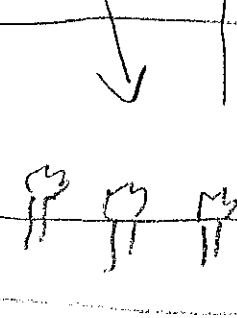
PART 1: Background Notes

and-arrow diagram

- the following: **Vis**
a process: **Radia**
on



- design.



ISP203A – Global Change
Greenhouse Effect

convection, radiation, conduction

20

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

Solar radiation creates visible light that radiates to the earth and is absorbed and reradiated by the earth's surface. IR waves are reflected to the greenhouse gases in the ozone. Then the greenhouse gases trap and send down infrared light,

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	Gases are warmer than the greenhouse gases	Greenhouse Gases

Objectives

Upon completing this activity, you will be able to:

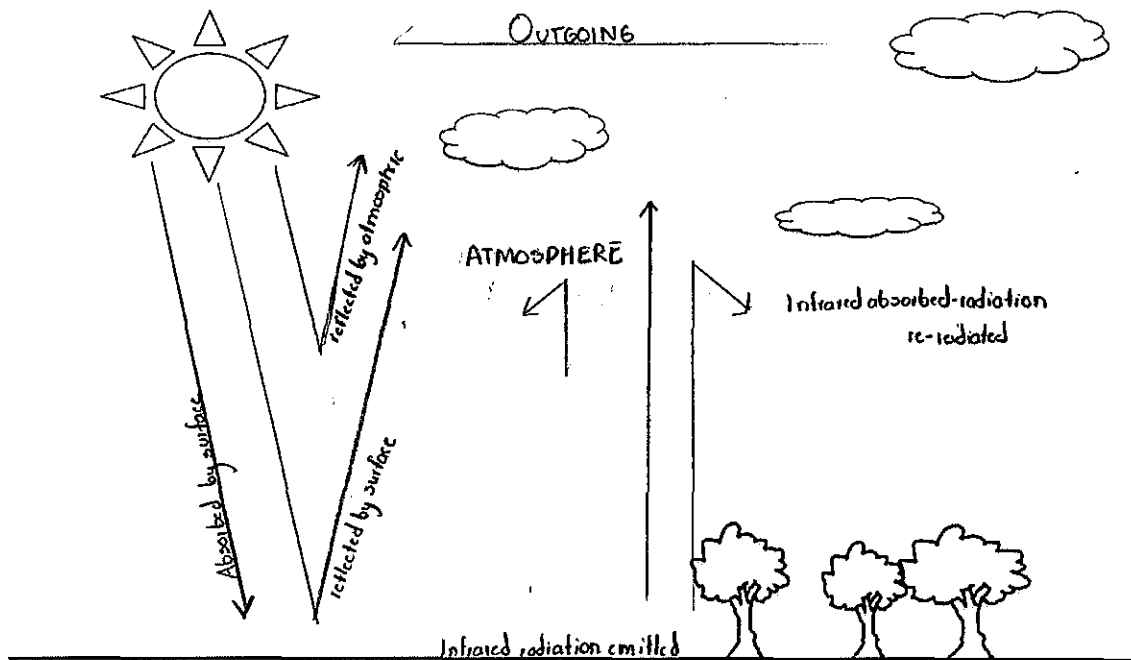
- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Traps thermal radiation	Capture energy
Soil, plants, other surfaces in greenhouse	Surface of the Earth. Biosphere	Absorb energy re-emit heat.
Solar radiation	Solar radiation	Incoming electromagnetic energy.
Heat inside greenhouse	Troposphere	Heat trapped
Reflection of visible light off the glass	Atmosphere, clouds, ozone layer	Albedo reflection.
Vents in the greenhouse	Escaping infrared radiation	Escaping energy

1621

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!

2. Write a complete explanation of the greenhouse effect process in words.

Electromagnetic radiation from the Sun passes through the Earth's atmosphere because of the atmosphere transparency. The radiation is absorbed by the surface and emitted as long-wave infrared radiation. The infrared radiation is absorbed by "greenhouse gases" (water vapor, carbon dioxide, methane) and re-radiated in all directions. This process effectively captures the Sun's energy and warms the troposphere.

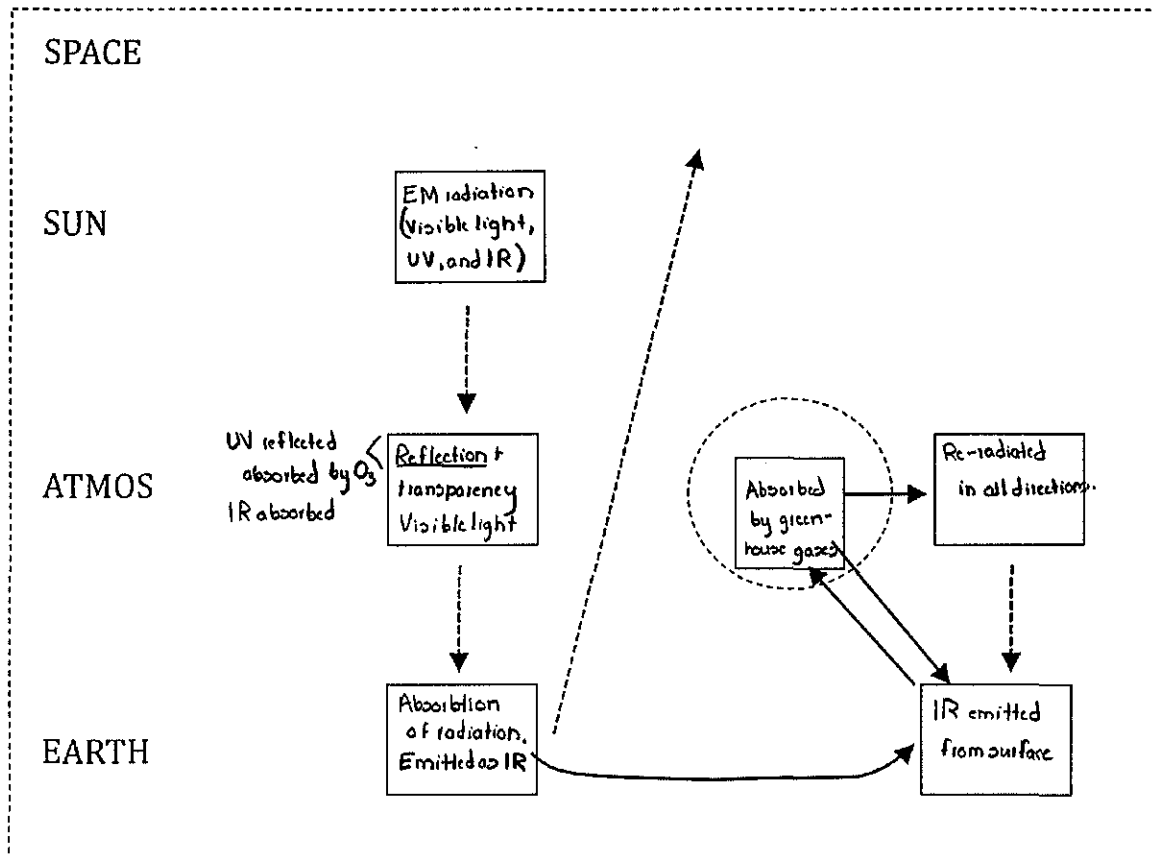
3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	Glass has a different transparency than the Earth's atmosphere. Greenhouse prevents loss of energy through convection.	Greenhouse Gases

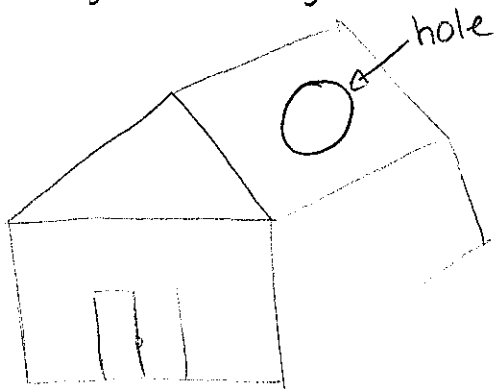
21

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR (Infrared)** energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.

A greenhouse is more efficient at capturing radiation than the atmosphere. To create a better analog one could change the transparency of the glass and introduce convective forces.



Now we have convection in here and more energy can escape from the greenhouse.

22

A42829869

A41729348

A42829869

A37669797

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!

2. Write a complete explanation of the greenhouse effect process in words.

Solar radiation from the sun reaches Earth's surface. It heats up Earth's surface and is reflected as infrared heat. The infrared heat is trapped in the Earth's atmosphere by greenhouse gases, such as CO₂ or methane. The greenhouse effect is what causes Global Warming. Some infrared waves escape the atmosphere because of empty space not taken up by greenhouse gases. The trapped infrared heat contributes to increased global temperatures.

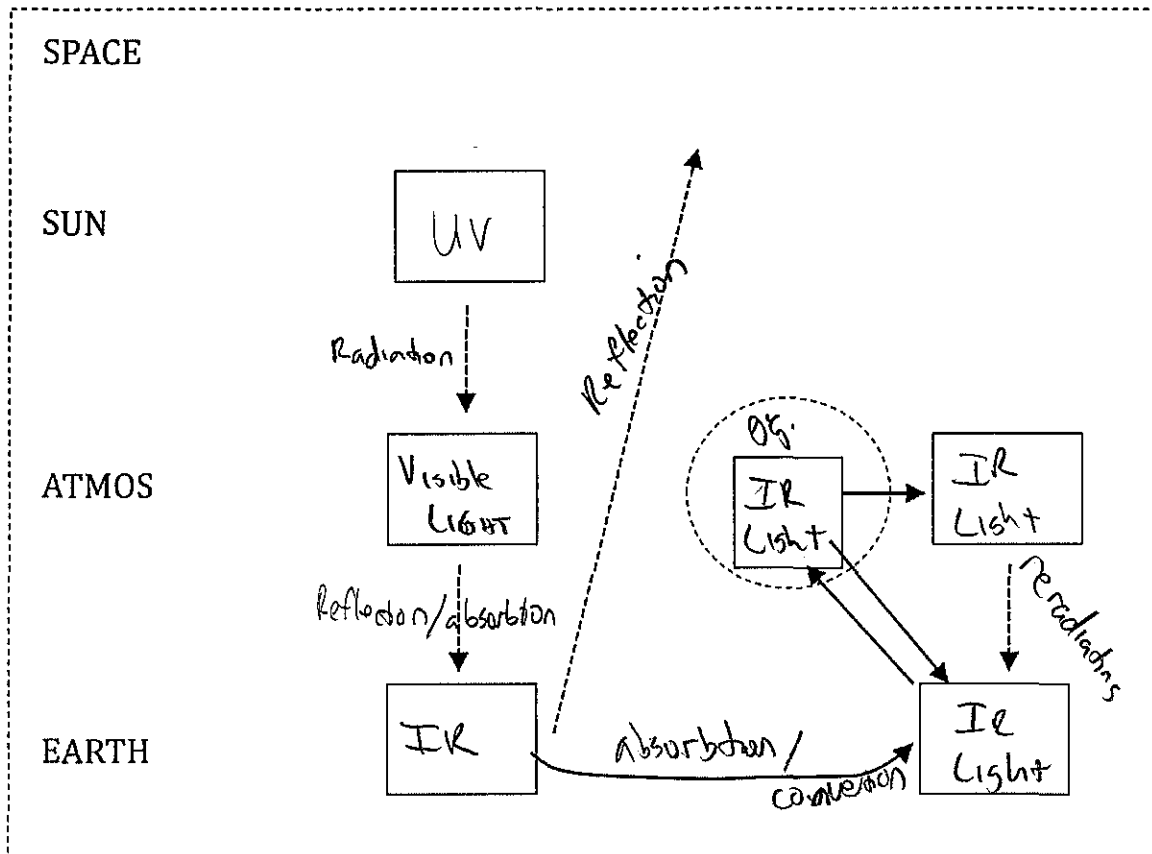
3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

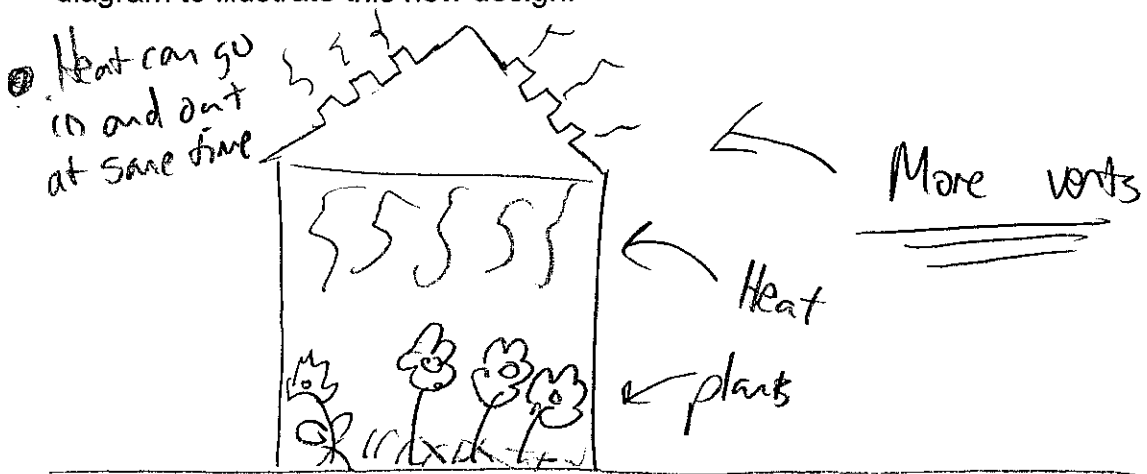
Greenhouse	Difference	Greenhouse Effect
Glass	Greenhouses keep warm air trapped inside whereas in the greenhouse effect greenhouse gases warm the earth by reradiating some energy back towards the surface.	Greenhouse Gases

22

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR (Infrared)** energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

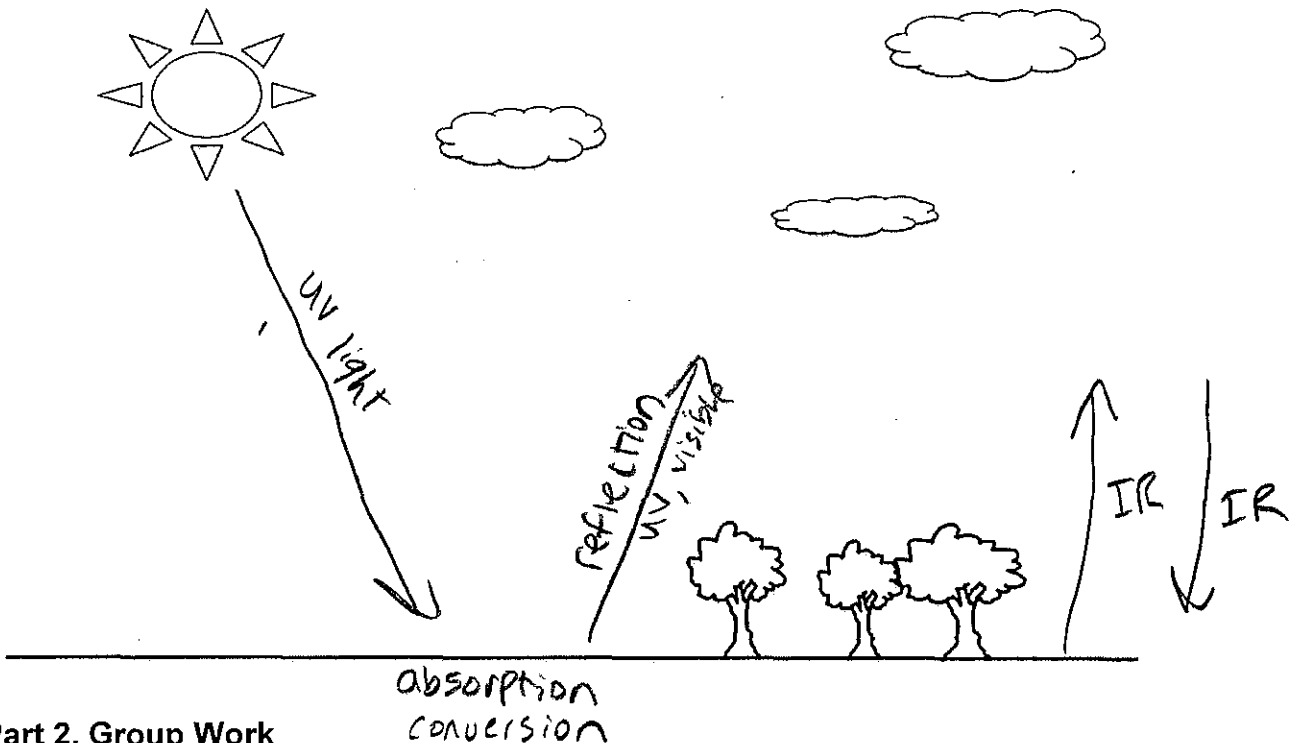
PART 1: Background Notes

ISP203A – Global Change
Greenhouse Effect

ES

GROUP #: **23**
Student IDs of Members Present:
A39474585
A39732455
A43050270

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Atmosphere	Absorbs heat reflects light
Soil, plants, other surfaces in greenhouse	earth surface	absorbs/reflects heat
Solar radiation	solar radiation	comes from sun UV + visible light + IR
Heat inside greenhouse	heat in atm	IR heat warms earth
Reflection of visible light off the glass	reflects off atm	protection from too much visible light
Vents in the greenhouse	escape from atm	allows heat/light to escape

23

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

Visible light along with smaller amounts of UV + IR light enter through the atmosphere and are either absorbed by the earth which changes the wavelength of the light, or reflected back. The ozone protects the earth from too much light entering

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	Both protection regulators mount up	Greenhouse Gases

- 23



- 23



Part 3: Homework

If you complete the group work, you may work on the homework **on your own**. This means your answers should be generally unique from other students' answers. **Submit your homework using ANGEL.**

1. Where would the heat radiated by the Earth go if greenhouse gases did not exist?

2. What would happen to the temperature of the atmosphere if you were to increase the amount of greenhouse gas in the atmosphere?

3. Imagine you were having a conversation with someone who said the greenhouse effect is the cause of global warming. Write a response to this statement that is scientifically correct based on what you have learned in this class and activity.

Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

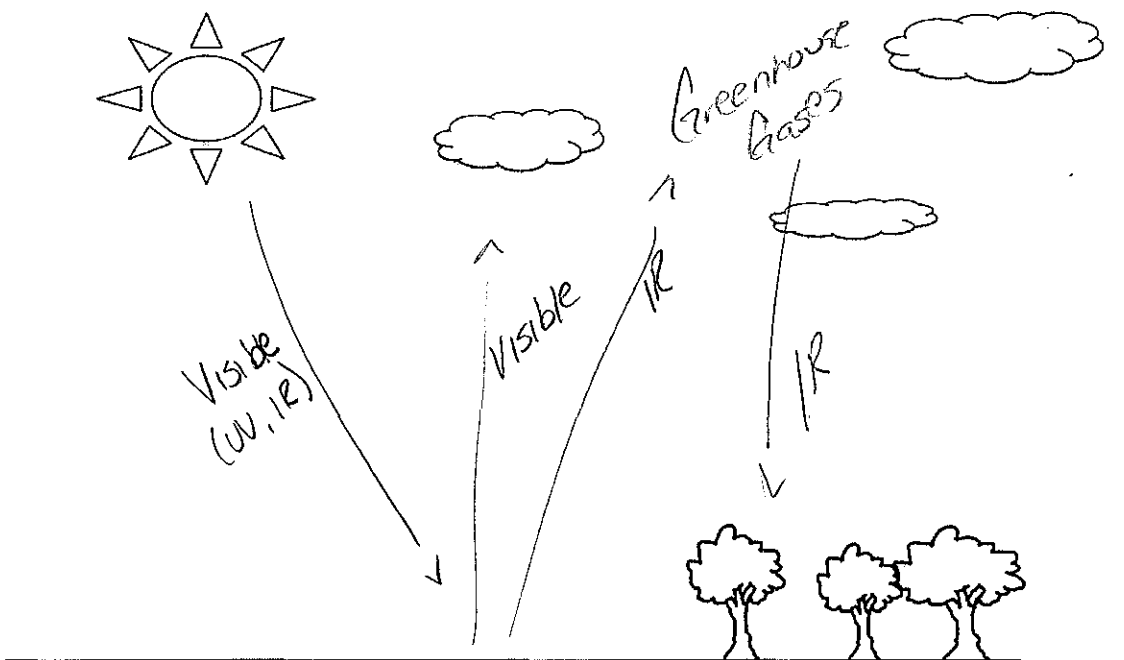
PART 1: Background Notes

ISP203A – Global Change
Greenhouse Effect

GROUP #: **24**
Student IDs of Members Present:

A43091747

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Greenhouse Gases	trap heat
Soil, plants, other surfaces in greenhouse	Earth's surface	absorption
Solar radiation	solar radiation	same
Heat inside greenhouse	heat in atmosphere	heat trapped
Reflection of visible light off the glass	absorption reemission of IR	heat reradiated
Vents in the greenhouse	space	loss of infrared

24

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

- 1) solar radiation
- 2) heat goes into greenhouse
- 3) the heat is absorbed then given back off through vents
- 4) after solar radiation heat can also be absorbed into plants not in the greenhouse
- 5) this entire process repeats.

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

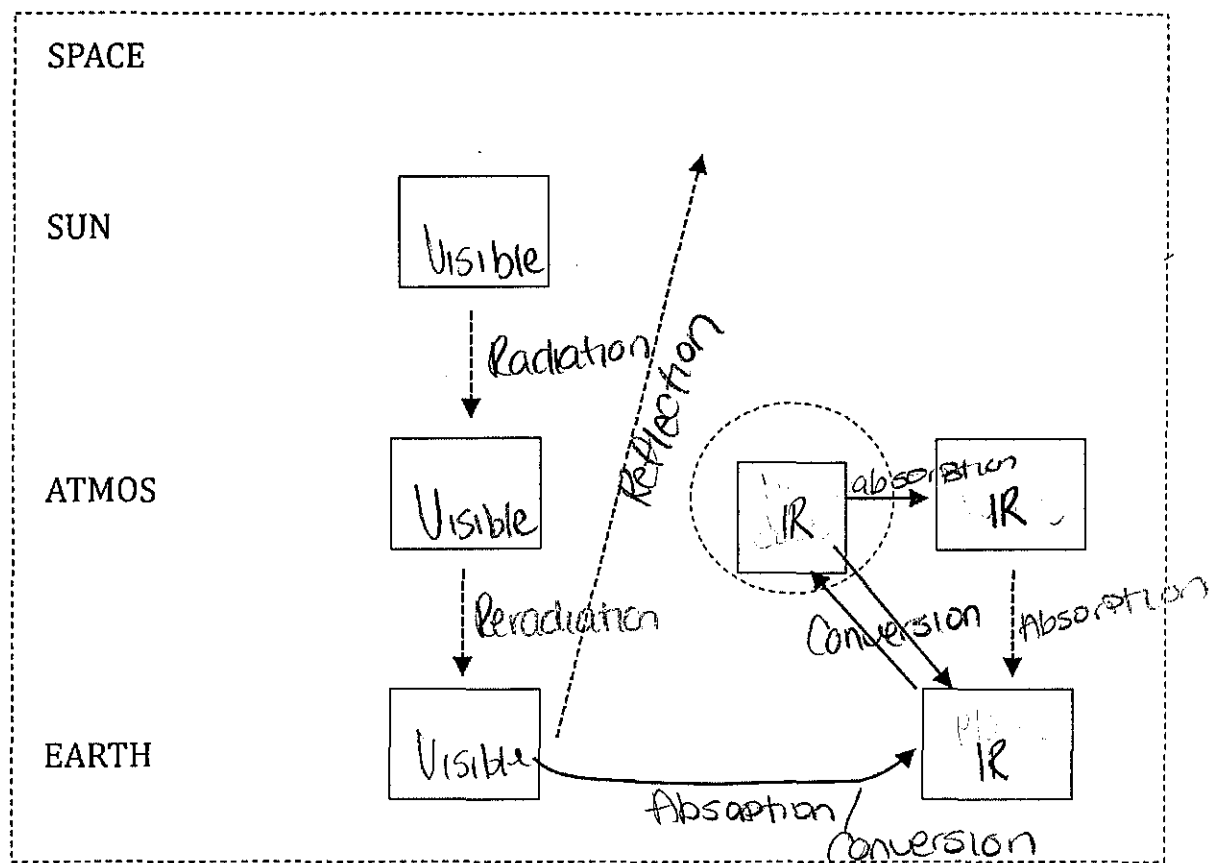
Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	Both trap heat & give it back off somehow	Greenhouse Gases

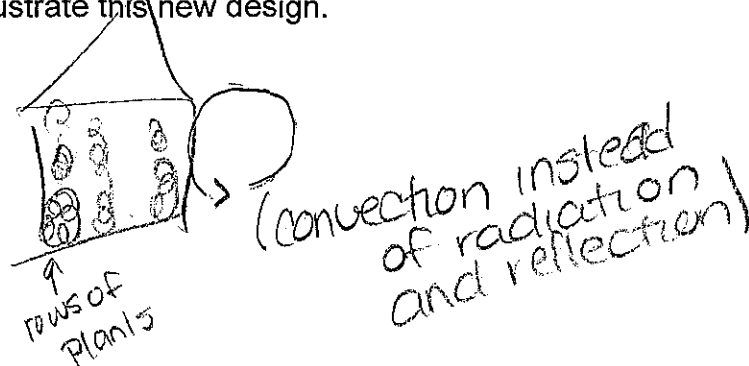
ISP203A – Global Change
Greenhouse Effect

24

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light, UV, IR (Infrared) energy**
 - Label each arrow with a process: **Radiation, Absorption/Conversion, Reflection, Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



Part 3: Homework

If you complete the group work, you may work on the homework on your own. This means your answers should be generally unique from other students' answers. **Submit your homework using ANGEL.**

1. Where would the heat radiated by the Earth go if greenhouse gases did not exist?
2. What would happen to the temperature of the atmosphere if you were to increase the amount of greenhouse gas in the atmosphere?
3. Imagine you were having a conversation with someone who said the greenhouse effect is the cause of global warming. Write a response to this statement that is scientifically correct based on what you have learned in this class and activity.

Objectives

Upon completing this activity, you will be able to:

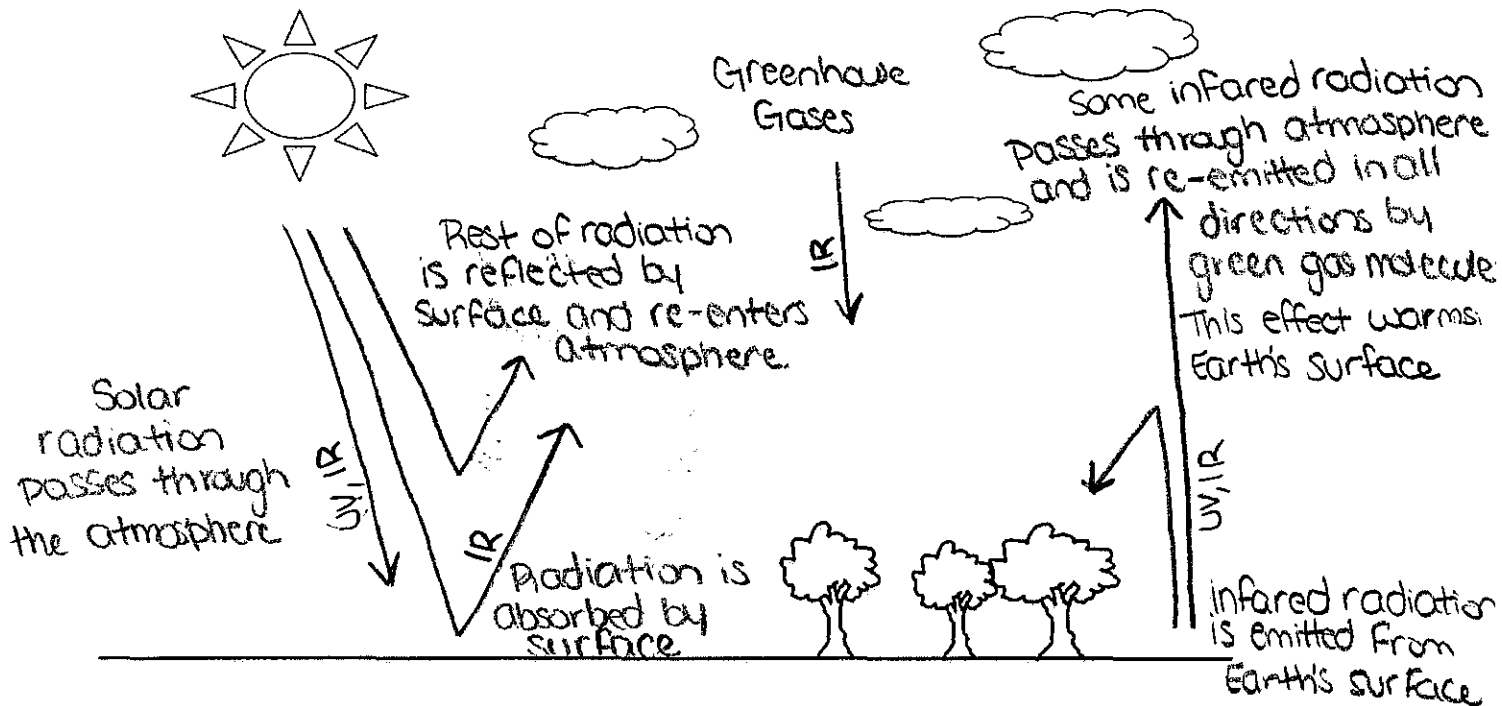
- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	longer infrared wavelengths, hard to pass through	traps heat and energy to warm earth.
Soil, plants, other surfaces in greenhouse	Absorb energy and heat.	Provide light, heat, energy, and moisture for growth.
Solar radiation	Greenhouse gases more transparent to incoming radiation	Used to sustain life
Heat inside greenhouse	Heat radiating and trapped in Earth's atmosphere.	Warm Earth's surface to help sustain life.
Reflection of visible light off the glass	Reflecting visible light off of Earth's surface.	Reflect some heat to help stabilize temperatures
Vents in the greenhouse	Holes in ozone that release heat and radiation in atmosphere	Release extra energy and heat into space

25

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!

Sun radiation → enter Earth atmosphere → ^{absorbed} → ~~reflected~~ → ^{into space} ~~trapped by atmosphere~~

2. Write a complete explanation of the greenhouse effect process in words.

It is the process where energy from the sun readily penetrates into the lower atmosphere and onto the surface and is converted to heat, but can't leave Earth freely. The trapped heat is what causes the temperature of the Earth. Increasing the Earth's surface temperature is what causes global warming.

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

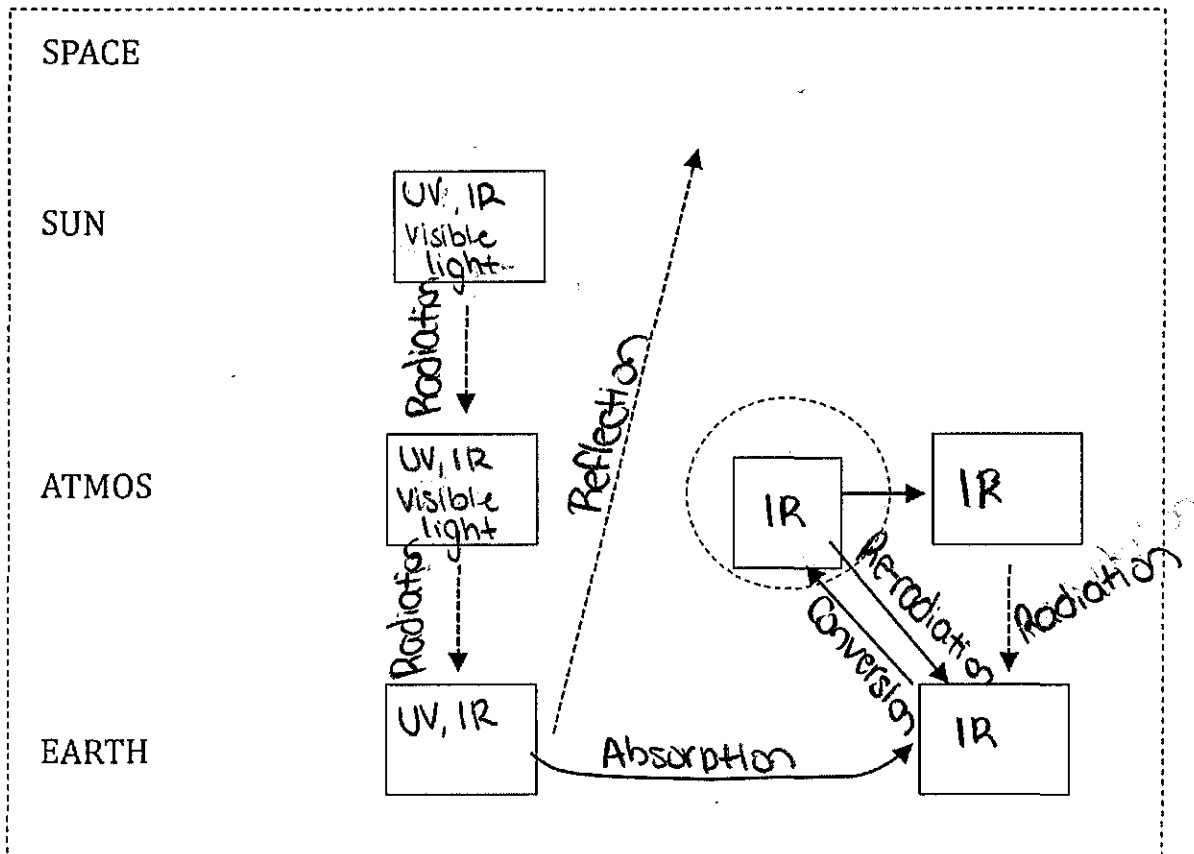
Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	Greenhouse gases can escape from Earth's atmosphere, things do not readily pass through glass.	Greenhouse Gases

ISP203A – Global Change
Greenhouse Effect

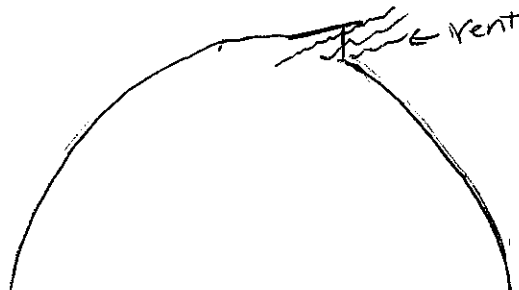
25

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR (Infrared)** energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.

The greenhouse should allow some heat to escape through vents, like how the Earth's atmosphere releases heat into space.



ISP203A – Global Change
Greenhouse Effect

26

Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

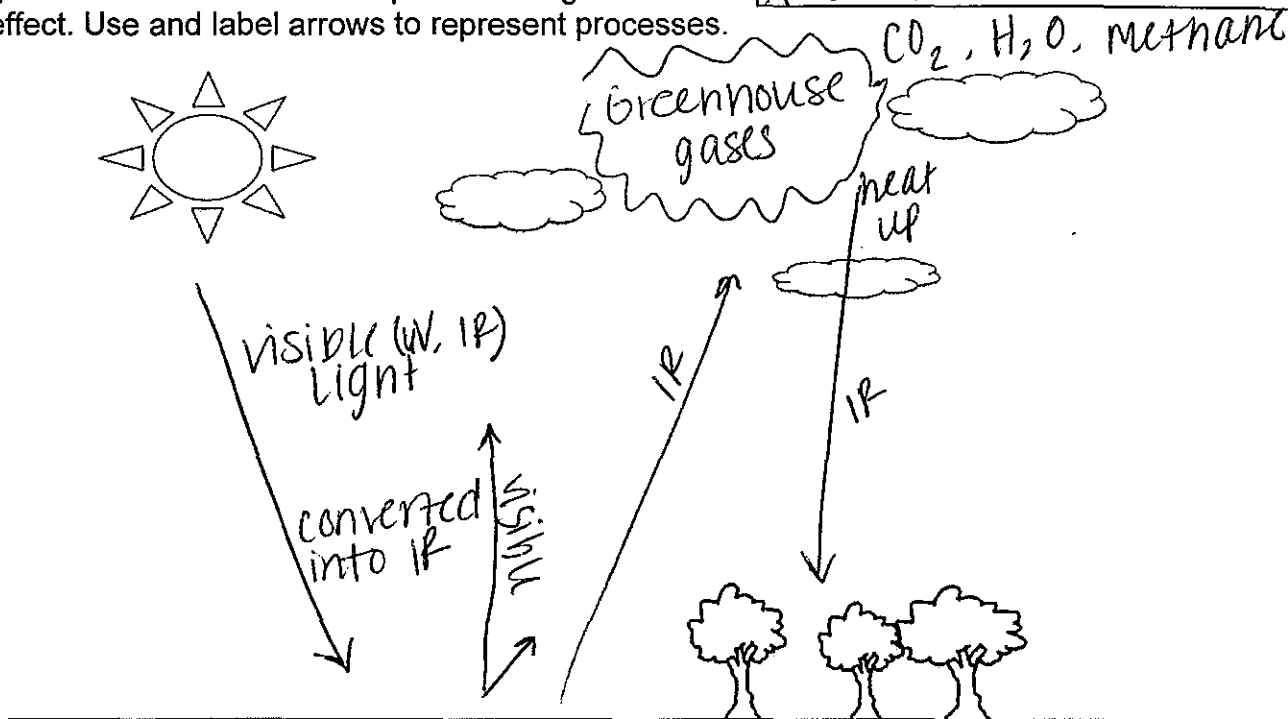
PART 1: Background Notes

ISP203A – Global Change Greenhouse Effect

26

GROUP #:
Student IDs of Members Present:
A42003289 A40850791
A39872700
A42107740

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Window Greenhouse gases	Both trap heat
Soil, plants, other surfaces in greenhouse	Earth's Surface	Both absorb & radiate heat
Solar radiation	Solar radiation	Solar radiation
Heat inside greenhouse	Heat in Atmosphere	How they trap the heat
Reflection of visible light off the glass	Reflection of infrared & visible light off surface	Greenhouse gases absorbing & re-emitting infrared
Vents in the greenhouse	Space (loss of infrared)	

25
26

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

Sun sends visible light to earth which is let in by atmosphere. when the Earth's surface reflects that light it changes it to infrared waves which greenhouse gases actually trap inside the atmosphere allowing for warm infrared to stay in our atmosphere.

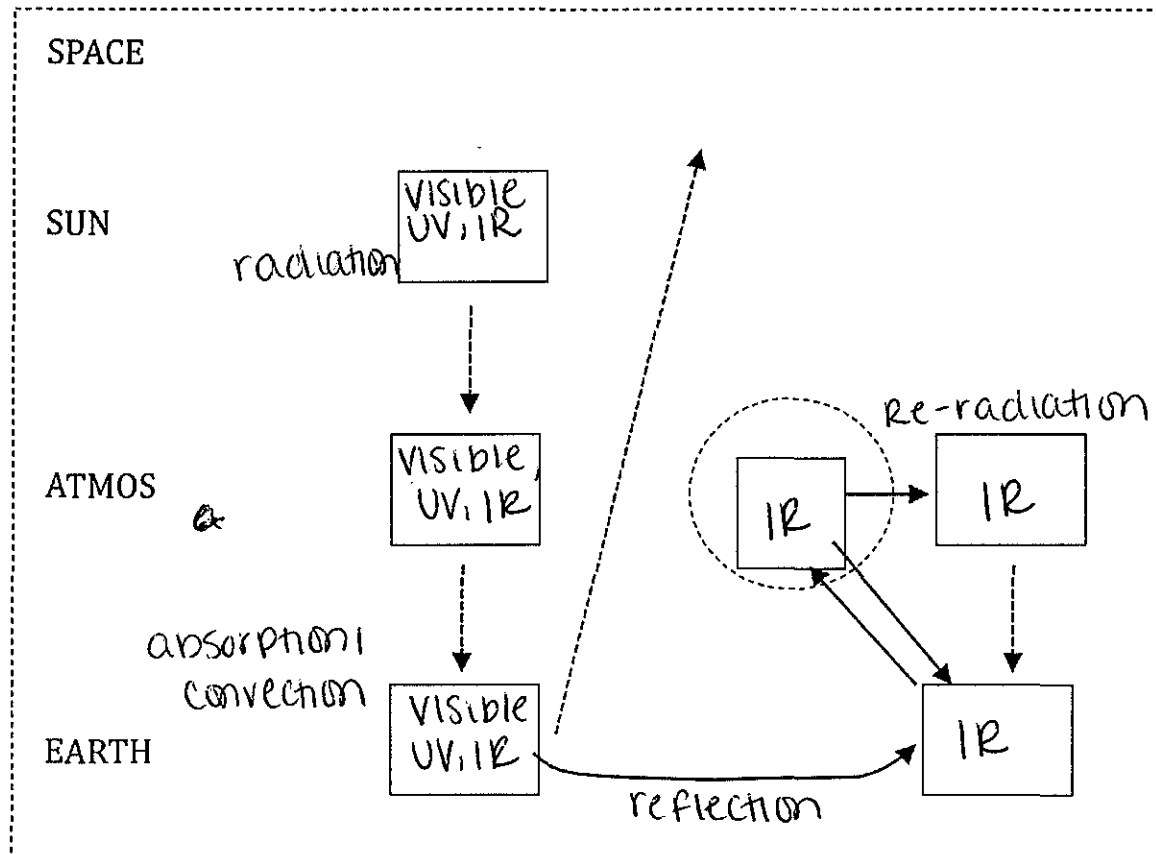
, absorbs and radiates

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

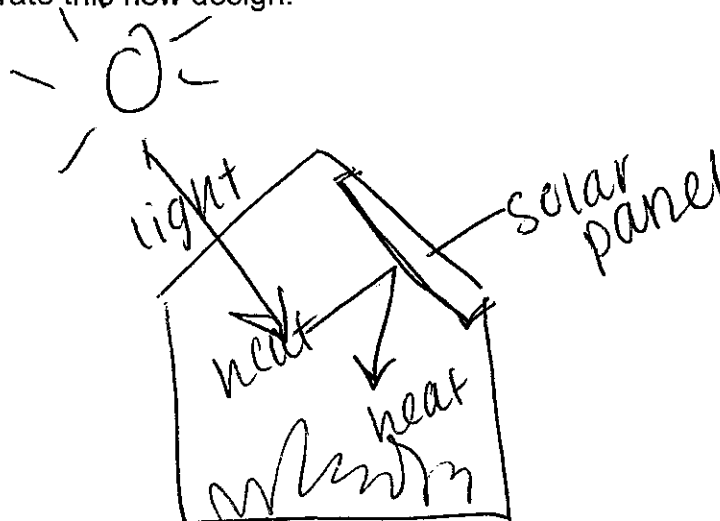
Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	Glass is more of a filter & a trap while gases just mostly trap	Greenhouse Gases

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR (Infrared)** energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



ISP203A – Global Change Greenhouse Effect

Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

radiation: energy transferred by waves

- infrared - energy w/ wavelengths above 700 nanometers
- ultraviolet - energy w/ wavelengths below 400 nanometers

ozone reflects & absorbs UV rays

greenhouse - mostly visible/infrared rays

- earth converts visible light and sends it out

*most prevalent form
of energy on earth:
visible light

↓
greenhouse gases prevent it from leaving
(H₂O vapor, methane, ↓
heats earth

* visible light is reflected
as infrared

Processes

radiation

reflection

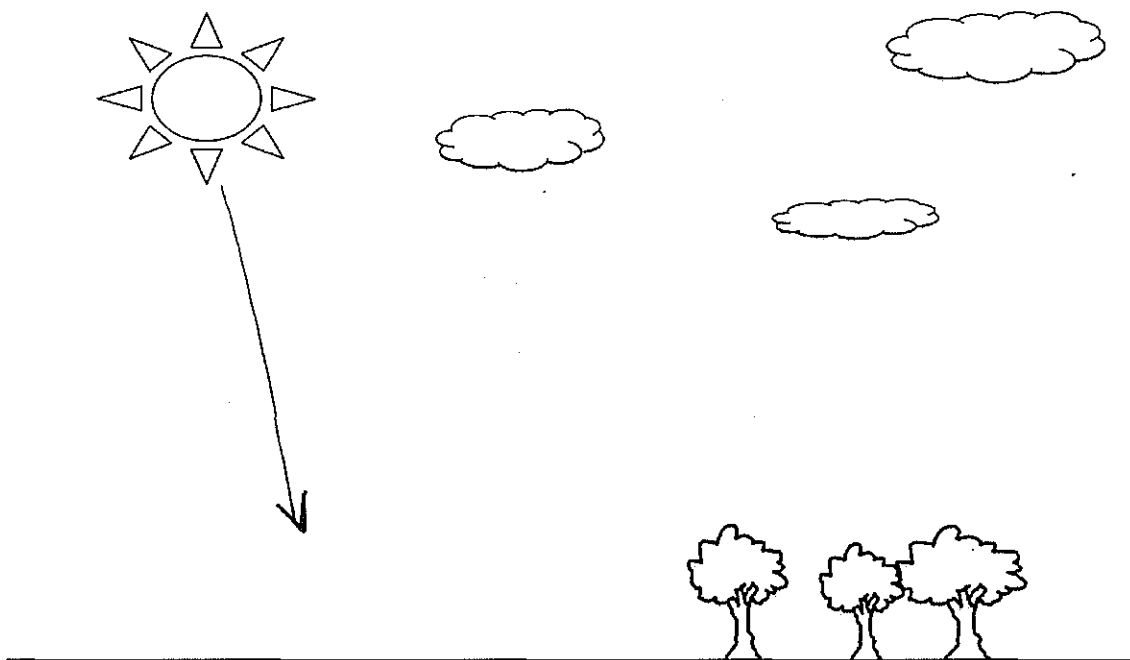
absorption/conversion

ISP203A – Global Change
Greenhouse Effect

GROUP #: **27**
Student IDs of Members Present:

A40967142
A4266964 A42422266
A4270499

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Greenhouse gases	Trap/reflect infrared (heat) energy
Soil, plants, other surfaces in greenhouse	soil, plants, earth's surface	absorb some of the energy
Solar radiation	Solar radiation	original state & source of energy
Heat inside greenhouse	infrared energy on earth	heats up the environment
Reflection of visible light off the glass	reflection of infrared rays off greenhouse gases	keeps heat inside
Vents in the greenhouse	space	let out some of the heat and energy

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!

2. Write a complete explanation of the greenhouse effect process in words.

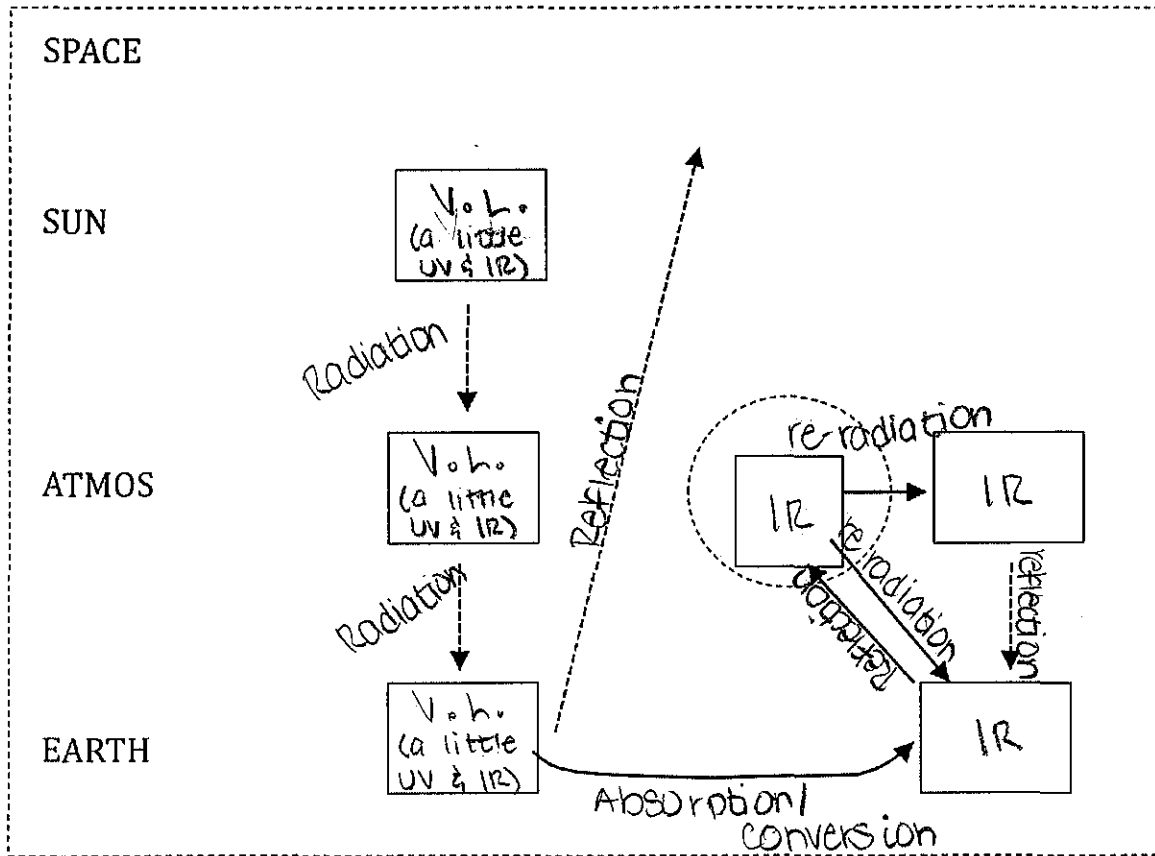
The sun produces solar radiation that goes into the Earth. The Earth absorbs the visible light and converts it to infrared energy. It reflects the heat, which is then kept in the Earth and returned back to surface by greenhouse gases.

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

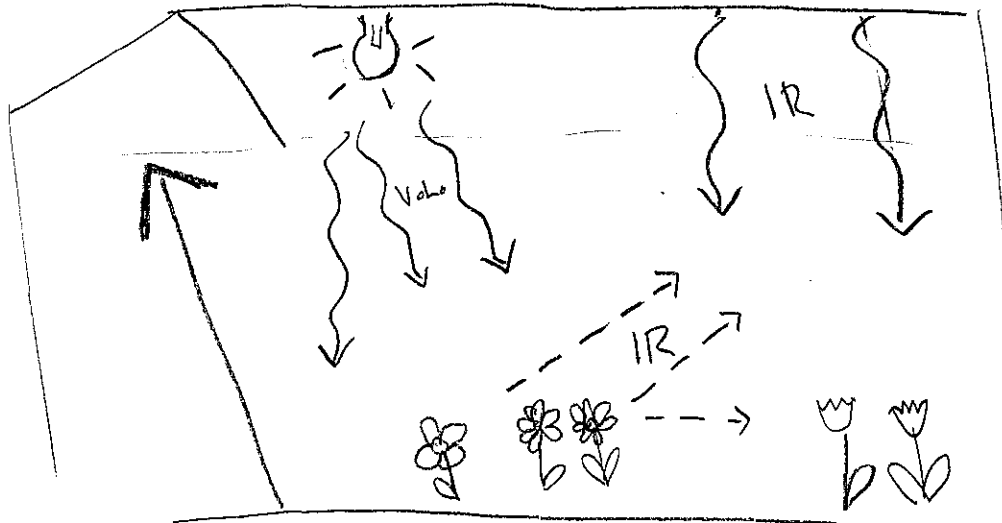
Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	← reflects re-radiates →	Greenhouse Gases

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR** (Infrared) energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

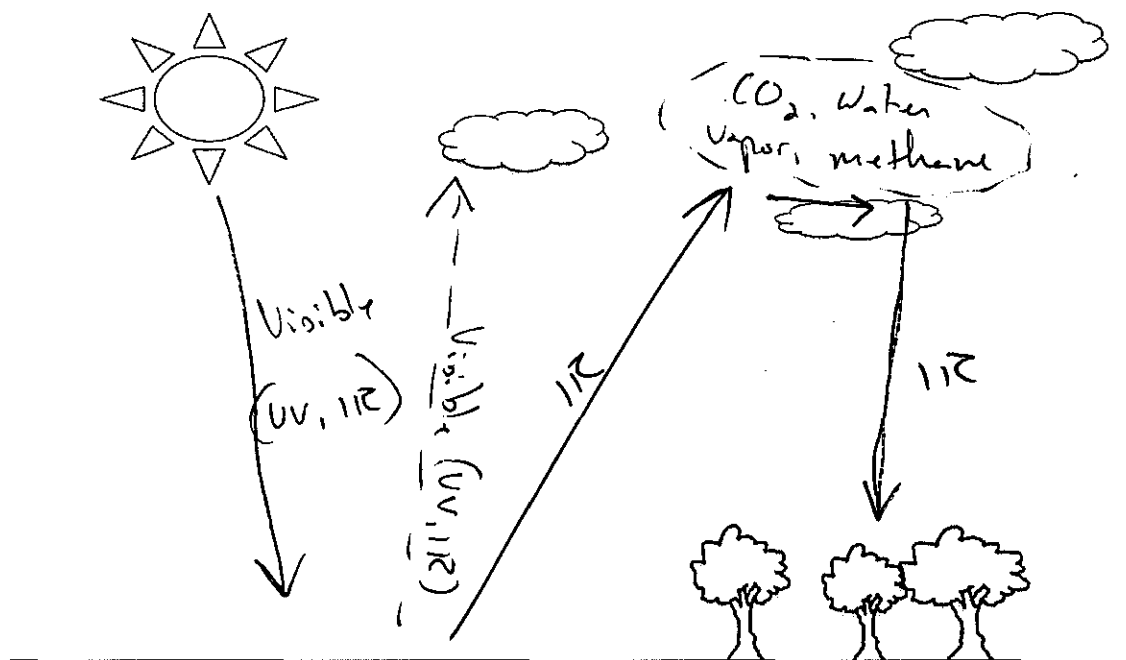
1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

ISP203A – Global Change
Greenhouse Effect

GROUP #: 28
Student IDs of Members Present:
A41930966
A43836396
A40678097
A41836115

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Greenhouse gasses in atmosphere.	Trap energy
Soil, plants, other surfaces in greenhouse	Things on Earth's surface that absorb energy.	Heat up
Solar radiation	Solar Radiation	Energy Source.
Heat inside greenhouse	Temp. in Biosphere	Certain temp. range needed for life.
Reflection of visible light off the glass	Light that doesn't make it thru atmosphere.	No effect.
Vents in the greenhouse	Light that escapes back out of atmosphere.	Doesn't affect gasses in atmosphere.

28

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

It's a process by which thermal radiation from a planetary surface is absorbed by atmospheric greenhouse gases and is re-radiated in all directions.

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

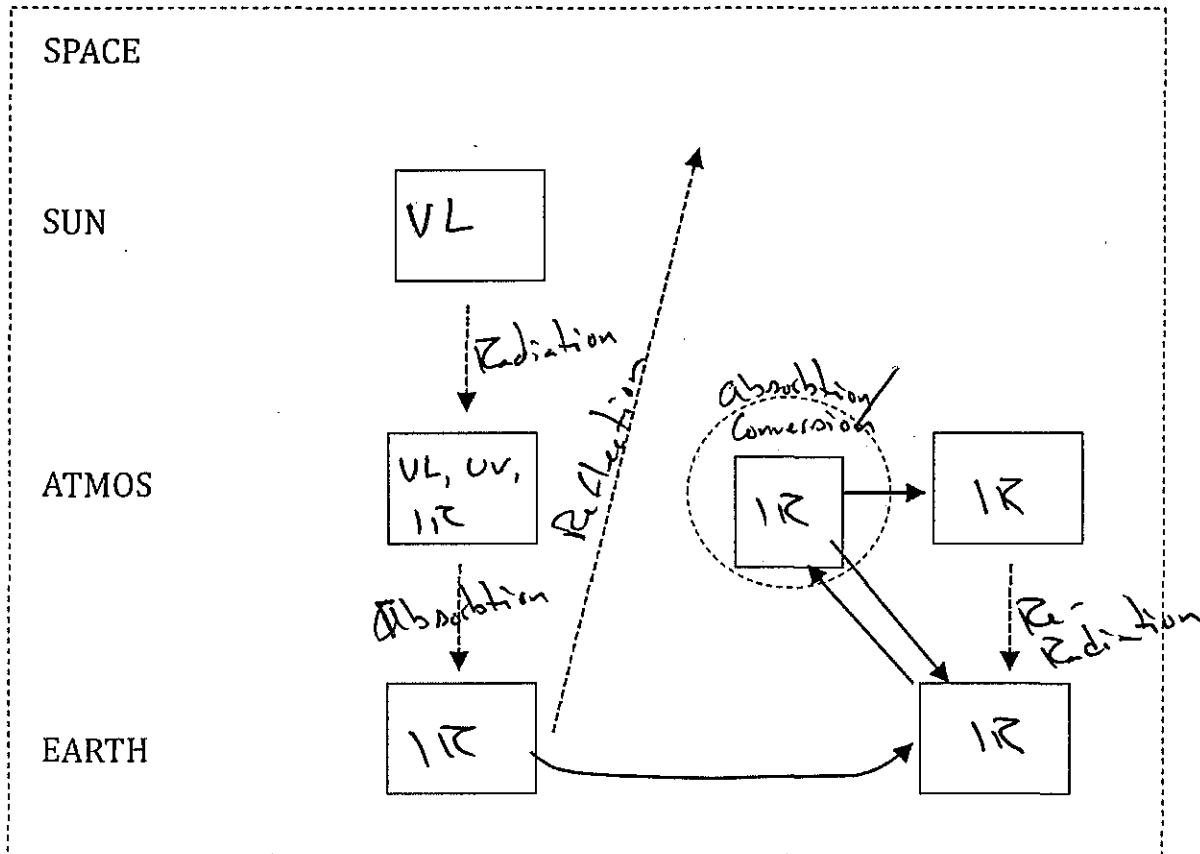
Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	glass is solid and can have things condense on it.	Greenhouse Gases

ISP203A – Global Change
Greenhouse Effect

28

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light, UV, IR (Infrared) energy**
 - Label each arrow with a process: **Radiation, Absorption/Conversion, Reflection, Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.

Take out the vents

Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

Causal Principles

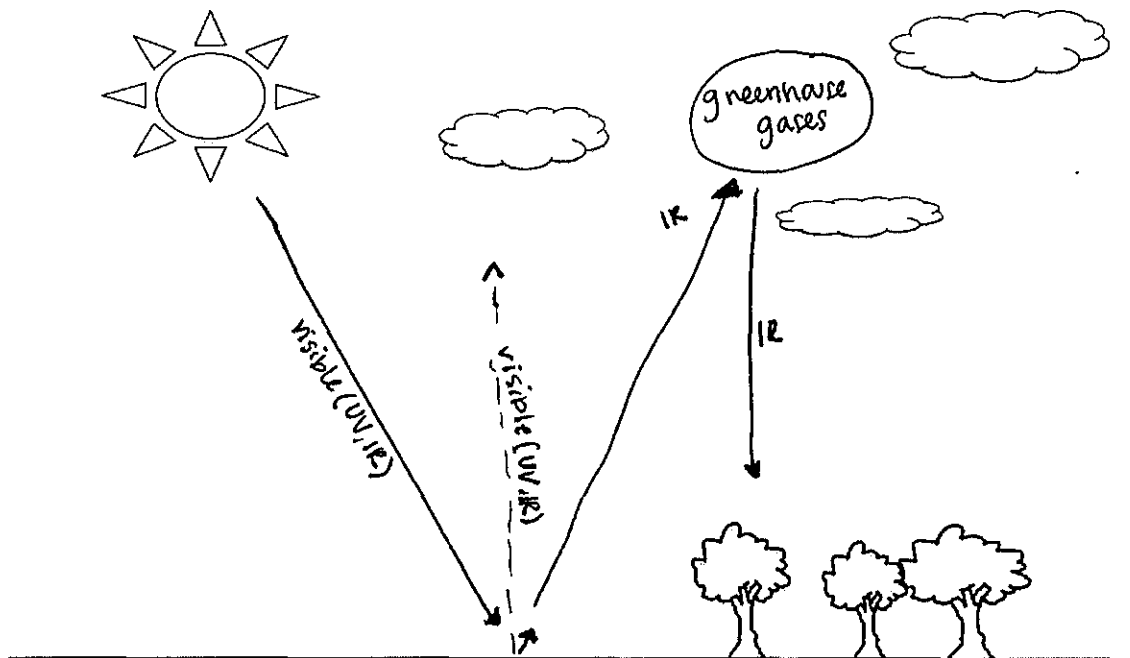
1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

ISP203A – Global Change
Greenhouse Effect

GROUP #: 29
Student IDs of Members Present:
A42672148 A43303247
A39112932
A42672148

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	greenhouse gases	both keep heat in
Soil, plants, other surfaces in greenhouse	same things on Earth (plants, soil etc)	both absorb light
Solar radiation	solar radiation	have same light source
Heat inside greenhouse	heat inside atmosphere	both stabilize temperatures
Reflection of visible light off the glass	reflection off of ozone absorption and reemittance of infrared by greenhouse gases	both keep out some light
Vents in the greenhouse	holes in the ozone space	both let heat out

29

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

The greenhouse effect is when the sun gives off UV and IR light and some enter the atmosphere and are absorbed by plants and soil. Some rays are reflected off the Earth and some escape while others are trapped inside and reflected or absorbed by the greenhouse gases. The more UV and IR rays in our atmosphere, the more it happens.

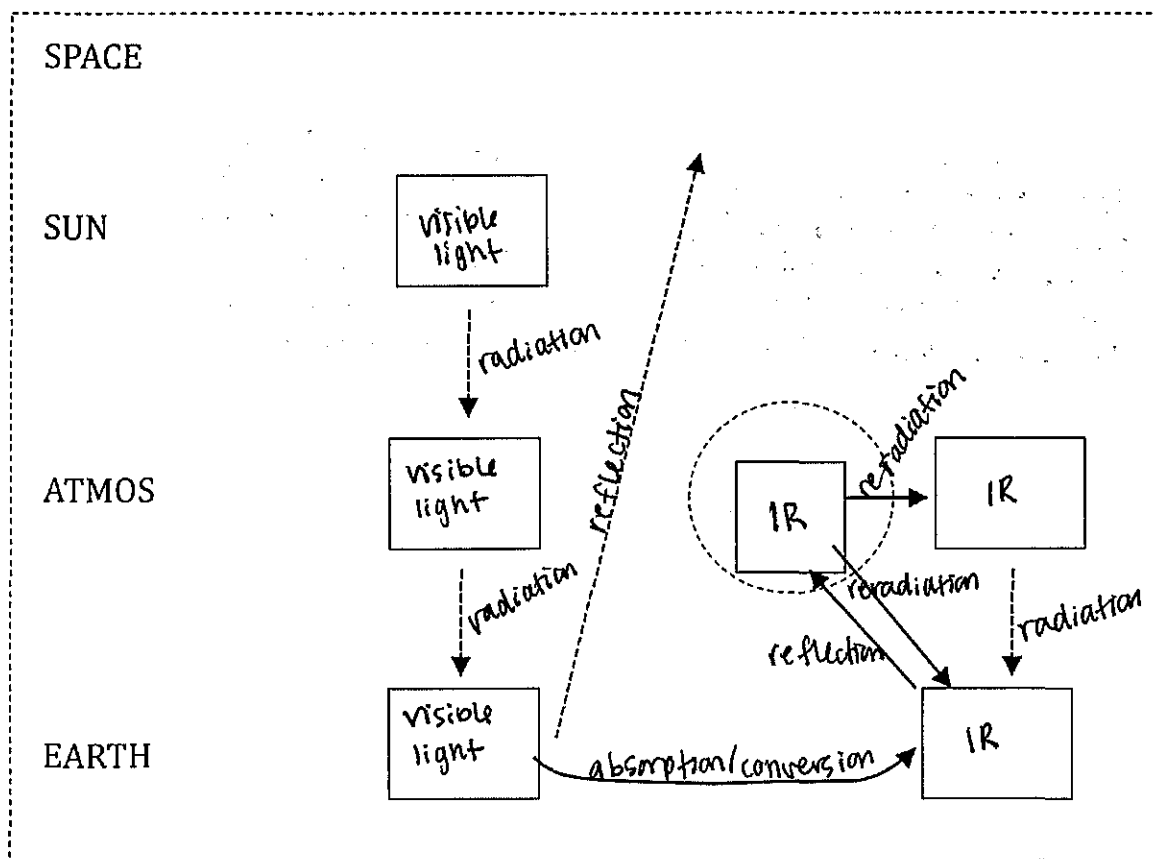
3. In Table B, describe how a greenhouse and the greenhouse effect are different.

Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	gases absorb some light and reflect it while the glass just reflects light gases reflect more than glass glass	Greenhouse Gases

29

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light, UV, IR (Infrared) energy**
 - Label each arrow with a process: **Radiation, Absorption/Conversion, Reflection, Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.

- ~~done~~ dome shaped greenhouse for better circulation
- add more fans like wind in our atmosphere

ISP203A – Global Change
Greenhouse Effect

30°

A428947C

A44266728

41387561

A4342551

Objectives

Upon completing this activity, you will be able to:

- Explain how natural processes involving greenhouse gases cause warming of the Earth's atmosphere.

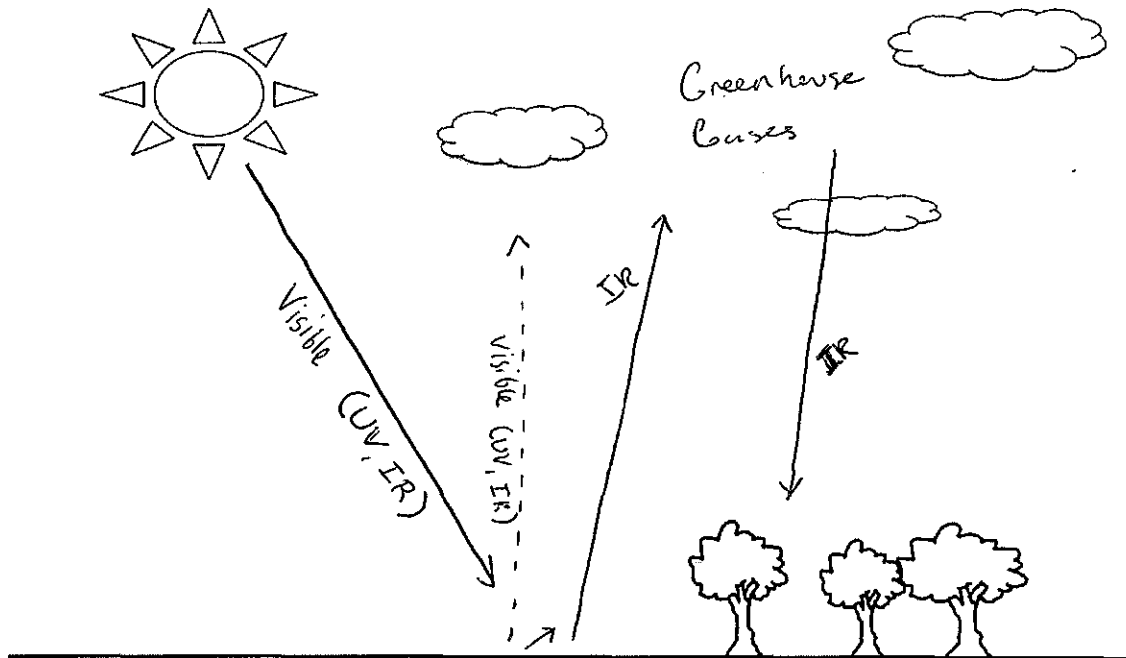
Causal Principles

1. Gravitational energy, thermal energy and/or chemical **energy** drive all movement and change of matter on Earth.
3. Matter moves and changes to return a system to **equilibrium**.
1. **Temperature** is a measure of the movement of molecules. Higher temperature means molecules are moving faster.

PART 1: Background Notes

30

On the diagram below draw in the features of the greenhouse effect. Label all parts of the greenhouse effect. Use and label arrows to represent processes.



Part 2. Group Work

What parts of a greenhouse correspond to the greenhouse effect?

Table A. Comparing a greenhouse and the greenhouse effect

Greenhouse	Greenhouse Effect	Common Role
Glass	Greenhouse gases	Allows visible light light and heat in and doesn't allow heat and moisture out.
Soil, plants, other surfaces in greenhouse	Earth's surface	Absorb light and radiates heat Also absorbs and radiates heat.
Solar radiation	Solar radiation	Gives visible, UV, and IR light and heat.
Heat inside greenhouse	Heat inside the atmosphere	Warms the atmosphere
Reflection of visible light off the glass	Ozone reflecting excess light.	To reflect excess light keeping earth cooler.
Vents in the greenhouse	Heat escaping Space	Allowing heat and light enter and exit our atmosphere keeping a livable temperature.

30

1. Complete the table by describing the common role played by greenhouse and greenhouse effect components. You might want to work with the greenhouse effect model we drew together!
2. Write a complete explanation of the greenhouse effect process in words.

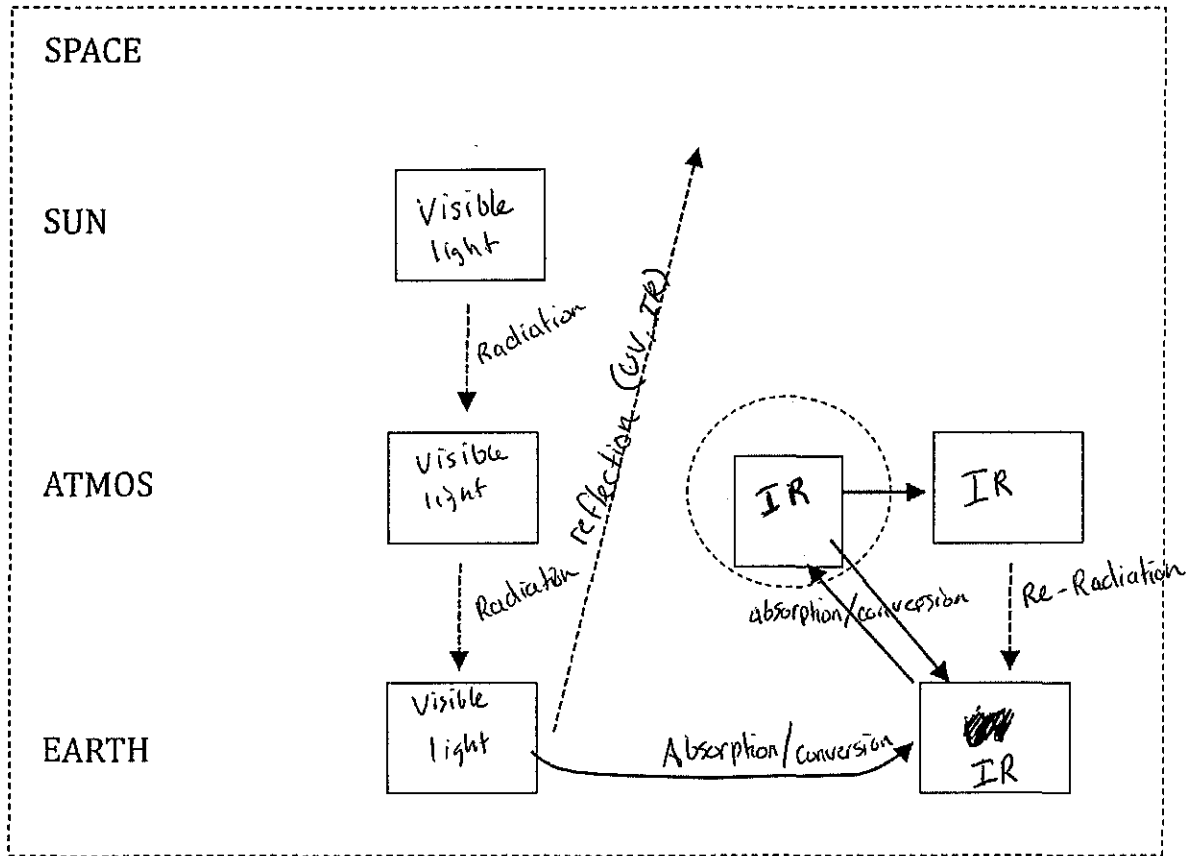
The sun gives off visible, ultraviolet, and Infrared heat and light which reaches the earth's surface. The earth absorbs some heat and light, then re-radiates heat into the atmosphere. Infrared heat reaches greenhouse gases that trap some heat on earth while other heat escapes into space.

3. In Table B, describe how a greenhouse and the greenhouse effect are different.

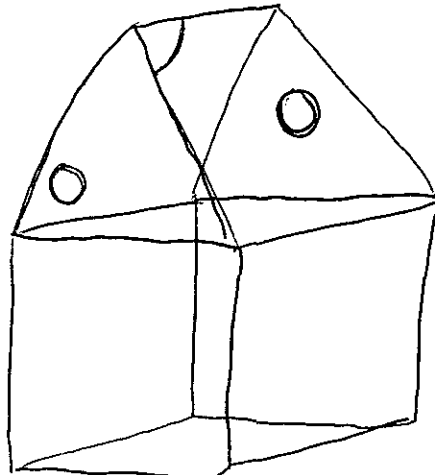
Table B. Differences between a greenhouse and the greenhouse effect.

Greenhouse	Difference	Greenhouse Effect
Glass	Not all types of light and heat cannot get through the glass while those same types of heat and light can get through greenhouse gases.	Greenhouse Gases

4. Complete the simple box-and-arrow diagram below.
- You have all of the boxes and arrows needed to explain the greenhouse effect.
 - In each box, put one of the following: **Visible Light**, **UV**, **IR** (Infrared) energy
 - Label each arrow with a process: **Radiation**, **Absorption/Conversion**, **Reflection**, **Re-Radiation**



5. How would you redesign a greenhouse to make the warming of the air in the greenhouse a better analog for the process that warms Earth's atmosphere? Draw a diagram to illustrate this new design.



Putting holes in the greenhouse like the ozone layer would allow more types light and heat can get inside the greenhouse and can also radiate some out.